BOARD OF COUNTY COMMISSIONERS

301 South Monroe Street
Tallahassee, Florida 32301
(850) 488-4710

October 4, 2004

Mr. Paul Thorpe
Northwest Florida Water Management District
81 Water Management Drive
Havana, Florida 32333

Re: Killearn Lakes Restoration - Florida Forever Grant Application

Dear Mr. Thorpe:

I am pleased to submit the attached Killearn Lakes Restoration - Florida Forever Grant Application. Leon County will allocate $247,000 as match to this worthwhile project if it is funded. Thank you for your consideration of the proposal.

Sincerely,

Andrea B. Simpson for P.A.

Parwez Alam, County Administrator

attached: Killearn Lakes Restoration - Florida Forever Grant Application

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT

FLORIDA FOREVER COMPETITIVE GRANTS PROGRAM DESCRIPTION AND APPLICATION PACKAGE

FY 2004-2005

For more information, contact:

Paul Thorpe
81 Water Management Dr
Havana, FL 32333
Telephone: (850) 539-5999

OVERVIEW

PURPOSE

The purpose of this application package is to solicit proposals from local governmental entities operating within the jurisdiction of Northwest Florida Water Management District's (District) 16-county area for cooperative or cost-share capital improvement projects.

The goal of this program is to support management efforts that improve water quality, in particular, but also those that implement stormwater improvements, restore natural systems, demonstrate best management practices (BMPs), implement water reuse or provide flood protection. Project proposals should clearly demonstrate water resources value.

ELIGIBLE APPLICANTS

Qualified applicants include government agencies, municipalities, counties, special districts, and other public entities. Interested private utilities and private not-for-profit corporations may participate in these capital improvement projects in partnership with a qualified public entity. Successful projects will receive funding from the District and would be expected to have additional funding or in-kind services from sources other than the District.

AVAILABLE FUNDS

The District will budget funds for this program on an annual basis. Due to the limited funds, cost sharing is highly encouraged. A qualified public entity may submit up to two applications annually.

INTRODUCTION

The Florida Forever Act (§259.105, Florida Statutes) authorizes the state's five water management districts to use Florida Forever funds for priority land acquisition and capital project expenditures. The water management districts' priority projects are established in the Florida Forever Five Year Work Plans that were initially developed in 2001 and are updated on an annual basis. The Act requires districts to apply at least 50 percent of the funds for land acquisition for water resource protection. Up to 50 percent, however, may be applied to capital projects, including the following:

- Projects identified through the District's Surface Water Improvement and Management (SWIM) program;
- Stormwater management projects;
- Water resource development projects;
- Waterbody restoration projects;
- Capital improvements (excluding transmission or distribution type facilities) to promote reclamation, storage, or recovery of water; and
- Other activities that would assist in meeting the goals of the Florida Forever Act (§259.105(4), F.S.).

The District completed its initial Florida Forever Five Year Work Plan in May 2001. Annual updates are completed by January 1 of each following year. The District's Florida Forever Five Year Work Plan identifies a number of potential capital improvement projects planned for implementation through District ongoing programs. Additionally, the plan sets aside funds for eligible capital projects proposed by qualified applicants. This document outlines the process that the District will use to receive requests from and ultimately distribute grant funds to qualified capital improvement projects.

APPLICATION PROCESS

The grant application process begins with an announcement of the opening of a grant funding cycle. The District will announce the cycle by mailing out postcards or letters to all cities and counties in northwest Florida, advertisement on the District's official website (http://www.state.fl.us/nwfwmd/), and an announcement in Florida Administrative Weekly.

Applicants are able to obtain an application package from the District's website or by calling or writing District headquarters. The announcement will indicate the deadline for submitting applications (see program schedule below) and will indicate the types of projects eligible for funding and the amount of funding dedicated to the Grant program by the Governing Board for the applicable fiscal year.

PROJECT SELECTION

After the deadline for submitting applications has passed, a Grant Evaluation Committee composed of District staff will evaluate and score each project to make recommendations to the Governing Board. The evaluation and scoring will be based on the criteria found in Table A (below). Projects submitted by small communities may receive 100 percent funding, and projects that address water quality improvements and the priorities of the District's SWIM Program will be weighed more heavily. Projects selected for funding will be monitored by District staff throughout the contract period. In the event a proposed project is phased and requires funding in future years, applicants will be expected to submit a competitive proposal for each subsequent fiscal year in accordance with the announcement issued by the District.

District staff will evaluate all eligible requests and present their recommendations for allocation of the funding to the Governing Board. All applicants will be immediately notified through mail of the Governing Board's decision for the selection of projects to be funded during the specified Fiscal Year.

PROGRAM SCHEDULE

The following schedule provides important dates for this program:

TASK	DATE
Distribution of applications	July 1, 2004
Application due from applicants	October 5, 2004
Evaluation of applications complete	October 8, 2004
Presentation to the Governing Board	October 28, 2004
Governing Board grant approval	November 23, 2004
Grant notification to applicants	December 6, 2004
Confirmation letters due from awardees	January 31, 2005
Agreements sent to awardees	March 3, 2005
Signed agreements due from awardees	April 11, 2005

CONDITIONS FOR RECEIVING FUNDS

- **Cooperative Agreement.** Each grant recipient must enter into a cooperative agreement with the District. The agreement will include terms and conditions for contract management and administration.
- **Completion of Projects.** Projects awarded grant funds must be completed within twelve months of execution of the cooperative agreement. Proposals indicating greater than one year for project completion will not be considered. In the event a proposed project is phased and requires funding in future years, applicants will be expected to submit a competitive proposal for each subsequent fiscal year in accordance with the announcement issued by the District.
- **Eligible Activities.** Only construction activities are eligible for grant funding. All associated costs, including design, engineering, inspection, land acquisition and monitoring, must be funded by the applicant or other partners. Funding of such activities qualifies as match spending.
- **Compensation Provisions.** Unless otherwise agreed to by the District in writing, grant funds will only be provided by reimbursement after completion of the entire project. In cases of financial hardship, the District may consider interim payments on a no-more-frequently than quarterly basis. Payments will only be made upon substantial completion of eligible construction activities, submission of an invoice and supporting documentation, and inspection by the District. Additionally, if the applicant is unable to work on a reimbursement basis, and if agreed to in advance and in writing by the District, payment may be made following receipt of an invoice from the applicant's contractor and an inspection by the District. In any event, the payment from the District will be in an amount not to exceed the eligible construction cost and the awarded amount, or a percentage of the project cost that is specified in the agreement, whichever is less.
- **Contract Administration Procedures.** Additional conditions will be required by the District for contract management and administration purposes.

SMALL COMMUNITIES ASSISTANCE

Through this program, the District will set aside at least ten percent of grant funds for eligible small communities, provided otherwise acceptable grant proposals were submitted as evaluated according to the Application Evaluation Criteria (Table A).

For the purposes of this grant program, "small community" is defined as:

1. A county with a population of 75,000 or less.

2. A municipality within a county described in subparagraph 1.

3. Any incorporated city with a population of 10,000 or less.

Table A: **APPLICATION EVALUATION CRITERIA**

Item	Criterion	Maximum Points	Explanation Of Criterion	Scoring Approach	Guidelines for Point Distribution
1.	Support of District's mission	30	How well does the project correspond to the mission, goals, priorities and strategies as specified in the District Water Management Plan, SWIM Plans, Regional Water Supply Plan?	*Objectively link points to District's mission and identified goals.*	➢ **10 points** if project can be considered part of a District and/or Department watershed plan, SWIM Plan, Water Supply Plan, Florida Forever Work Plan, or similar. ➢ **5 points for each of the following areas** Flooding, Water Supply, Natural Systems, Water Quality (20 points max). ➢ **5 points** if project will directly enhance or add to an ongoing District project.
2.	Type and extent of existing problem	15	Is there a documented problem? What is the significance of this problem regarding water resources?	*Objectively link points to extent and type of existing problem to be addressed.*	➢ **15 points** for a significant problem effecting a large area or population. ➢ **10 points** for localized problem that contributes significantly to adverse cumulative impacts on watershed conditions. ➢ **5 points** for a local problem affecting a small part of a watershed or population. ➢ **0 points** if problem is not well-defined or the problem can be solved without the proposed project.
3.	Improvements to water quality and quantity	15	Will the project improve water quality or water supply and by how much? Do these improvements sufficiently address the identified problem?	*Credit for extent of water quality / quantity improvements.*	➢ **10 points** if project's improvements address the identified problem 100 percent ➢ **1 to 9 points** awarded based on percentage of project's improvements that address identified problems (i.e., 50 percent, 5 points). ➢ **5 points** if project improves water quality or water supply.
4.	Improvements to surface water ecosystem	15	What is the classification of the receiving water body? Does harm to the receiving waterbody or associated natural system occur on a frequent basis?	*Better define where water quality improvements needed and points awarded.*	➢ **15 points** OFW/Class I, or Area of Special Concern identified by the District. ➢ **15 points** for other water resources with severe or chronic and clearly documented impacts. ➢ **10 points** for moderate and clearly documented impacts. ➢ **5 points** if impacts by themselves are not significant or if problems are not clearly documented but are likely contributors to cumulative impacts (extent uncertain). ➢ **0 points** for no known impacts.

Item	Criterion	Maximum Points	Explanation Of Criterion	Goals	Recommended Point Distribution
5.	Ability to implement and maintain the project	15	Does the applicant have the ability to see the project through to completion and provide long-term ownership, operation and maintenance? Has the applicant established a stable, dedicated funding source to maintain the project? Does the applicant propose to share in the cost of the project? If so, at what level?	*Scale permitting and cost-share arrangements.*	➢ 1 to 5 points based on projected ease of obtaining permits: ➢ 0 to 5 points based on availability and level of completion of detailed designs ➢ 0 to 10 points based on ability and commitment of applicant to provide for long-term maintenance (Reject project if zero points earned from this criteria).
6.	Financial need of applicant	10	What financial resources are available? Would the project be completed without funding assistance?	*Provide framework linking points to community size and funding levels.*	➢ 10 points to small communities without available financial systems in place to provide match. ➢ 5 points for larger entities having some direct match from a 3rd party source (e.g. federal grant, stormwater utility, private partner). ➢ 0 points if project could be completed without funding assistance.
	TOTAL	**100**			

Attachment # 1
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Northwest Florida Water Management District
FLORIDA FOREVER COMPETITIVE GRANT PROGRAM
FY 2004-2005

APPLICATION FORM

Please answer all of the questions in this form. An electronic version of this form can be obtained from the Northwest Florida Water Management District (NWFWMD) website (http://www.state.fl.us/nwfwmd/). Applications should not exceed ten pages and must adhere as closely as possible to this form - evaluation points may be deducted for missing information. Please cite references as appropriate, but DO NOT provide supporting documents – if needed, District staff will contact the applicant to request supporting documents. *Return two (2) completed forms and one (1) electronic copy MS Word (CD or disc) to: Paul Thorpe, NWFWMD, 81 Water Management Dr., Havana, FL 32333.*

Applications must be received at District Headquarters by 3:00 PM EDT on Tuesday, October 5, 2004.

Please type (field will expand) or print clearly.

1. Project Name: Killearn Lakes Plantation Restoration: Clean Lakes Project		
2. Name(s) of Applicant(s): Leon County		
3. Name, Address, & Phone Numbers of Project Manager		
Name:	Tony Park, Director Leon County Public Works	
Mailing Address:	Leon County Public Works, 2280 Miccosukee Road	
City/State:	Tallahassee, FL	ZIP 32308
Phone:	(850) 488-8003	FAX (850) 488-1260
E-mail address:	tonyp@mail.co.leon.fl.us	
4. Signature and Date	The application must be signed and dated by an individual who has the appropriate authority to prepare and submit grant applications on behalf of the applicant(s).	
Signed:	Andrea B Simpson for Parwez Alam	Date 10/5/04
Type or print name:	Andrea B. Simpson	
Title:	Assistant to County Administrator	
5. Funding Request/Matching Funds		
Note: Applicant shall pay all non-construction costs. District grant funds shall only be used for construction activities.		
Amount of money requested $	**$332,000.00**	
Total project cost $	**$579,000.00**	
Percentage of total project cost to be covered by the District:	**57.3%**	

6. Project Summary (Include water resource benefits, applicant or other local government entity that will own the capital improvement, and date of governing body action to transmit application.)

The Killearn Lakes Plantation (KLP) lakes/stormwater ponds are in the Ochlockonee-St. Marks DEP Group 1 Watershed. They drain into Lake Iamonia, which is listed on FDEP's St. Marks Master 303D list as impaired and scheduled for a TMDL in 2007. Individual lakes and "green" public areas within the chain, are listed for various problems, including high bacteria, but were dropped from the verified list because of insufficient data. These lakes have been shown to have high TSI's and contribute nutrients to Lake Iamonia. The KLP lakes are also recreational water bodies used by anglers and boaters in a highly urbanized area. Since 1993, water quality has generally declined in all lakes based on Lake Watch data collected by volunteers. Stormwater runoff carries significant nutrients and other pollutants into all KLP lakes. The proposed project is an effort by Leon County to address deteriorating water quality (as documented from Florida Lake Watch data) in Lake Iamonia, an impaired water. The project will involve sediment removal, BMP implementation and education outreach. One lake (Blue Heron) will serve as the sediment removal "pilot project" or "demonstration project" where multiple BMPs will be utilized. These BMPs will include a "mini-wetland" area (protecting aquatic vegetation from the grass carp population), catch basins ("exfiltration trenches or smart-boxes"), berms, swales and aquatic plantings along the shoreline and lake buffer zones. Although sediment removal will be targeted in Lake Blue Heron and Lake Monkey Business, the BMPs will, in addition to Blue Heron, be constructed in primarily greenway areas around the other Killearn Lakes (Arrowhead, Pine Hill, Petty Gulf, Diane and Monkey Business). An education outreach program developed by the Leon County Extension Service, KLHOA, and tappwater.org will be implemented over the two year project timeframe. The project is anticipated to reduce Total Nitrogen by a total of 25,963 kilograms per year (or approximately 60,000 pounds per year) and sediment will be reduced by 75%. Monitoring will be performed to determine the effectiveness of the stormwater treatment BMPs. In addition, an education demonstration project will be implemented.

Leon County will be responsible for the project and the capital improvement will be owned by the Killearn Lakes Homeowner's Assocation (KLHOA). The operation and maintenance of the project will be the responsibility of the KLHOA pending completion.

Date of governing body action to transmit application: There is a county match agreement for a current year DEP 319 project (that was not funded) in place and approved by the Leon County Commission on July 27, 2004 for an amount of $247,000. Attached is another letter of commitment for the Florida Forever funding match (same amount) that will voted on October 12, 2004. As soon as the county has officially voted of the match approval, the NWFWMD will be notified immediately.

7. Detailed project description

a) Please provide a description of the proposed project. Include address, section, township, range. Identify the basin or watershed in which the project will take place (separate map attachments are acceptable). What are the project's specific water resource benefits? Does it correct an existing water quality problem, stormwater treatment etc.? Is the project underway or still in the planning stage?

Project description:

Watershed Name: Ochlockonee River Watershed
Latitude: 30.60
Longitude: -84.24
Hydrologic Unit Code (HUC): 3120003
Land Use Total: 4,029 Acres
Please see Appendix A for detail of Killearn Lakes

See below (Project Specific Water Resource Benefits)

1. Project Address/Location: Killearn Lakes Homeowners Association, 7110 Beech Ridge Trail, Tallahassee, FL., 32312

2. Section: 19-36,1-13 Township: 3N 1E Range: 2N 1E

Project's specific water resource benefits:

The proposed project is an effort by Leon County to address deteriorating water quality (as documented from Florida Lake Watch data) in Lake Iamonia, an impaired water. The project will involve sediment removal, BMP implementation and education outreach. One lake (Blue Heron) will serve as the sediment removal "pilot project" or "demonstration project" where multiple BMPs will be utilized. These BMPs will include a "mini-wetland" area (protecting aquatic vegetation from the grass carp population), catch basins ("exfiltration trenches or smart-boxes"), berms, swales and aquatic plantings along the shoreline and lake buffer zones. Although sediment removal will be targeted in Lake Blue Heron and Lake Monkey Business, the BMPs will, in addition to Blue Heron, be constructed in primarily greenway areas around the other Killearn Lakes (Arrowhead, Pine Hill, Petty Gulf, Diane and Monkey Business). An education outreach program developed by the Leon County Extension Service, KLHOA, and tappwater.org will be implemented over the one year project timeframe. The project is anticipated to reduce Total Nitrogen by a total of 25,963 kilograms per year (or approximately 60,000 pounds per year) and sediment will be reduced by 75%. Monitoring will be performed to determine the effectiveness of the stormwater treatment BMPs. In addition, an education demonstration project will be implemented.

Background

The Killearn Lakes Plantation (KLP) Chain of Lakes drain into Lake Iamonia on the southern shore. Lake Iamonia is a mostly oligotrophic 5,757 acre Outstanding Florida W\aterbody (OFW), well known for its superb wildlife habitats.

The Lester Cove, Phase I, Base Flow Report reached the following conclusions:

1) Monkey Business Tributary (MBT), which issues from the 'Killearn Lakes Plantation Chain of Lakes' delivers most of the nutrients to Lester Cove in times of low water, base flow or drought.
2) A seep from one of the Waste Water Treatment Ponds (WWTP) consisting of 80% effluent was found. Surface and subsurface flows consisting of 50% effluent were found at the Killearn Lakes Impoundment (KLI).
3) The data clearly show that under low flow/drought conditions the nutrient loading to Lester Cove was dominated by Monkey Business Tributary (MBT) and the Talquin Facility was found to have a negligible impact.

The Lester Cove, Phase II, The Storm Report relates several important conclusions:

1) Lake Iamonia is a clean, mostly oligotrophic, 5,757 acre natural lake, whose major source of nutrient enrichment is the Ochlockonee River.
2) The water bodies in the "Killearn Lakes Plantation Chain of Lakes" are not natural lakes, they were designed, constructed and permitted to function as Stormwater Retention Ponds. They are supposed to settle out the stormwater collected in the residential development, protecting Lake Iamonia.
3) The waters in the 'Killearn Lakes Plantation Chain of Lakes' become eutrophic at Lakes Arrowhead, Petty Gulf, Pine Hill, Diane, Blue Heron and Monkey Business. All the lakes are eutrophic while Lake Pine Hill is considered mesotrophic based on Lake Watch parameters (Lake Watch, 2003). The eutrophic status of the 'Killearn Lakes Plantation Chain of Lakes' continues into Lester Cove. Water quality improves as one moves out of Lester Cove towards the center of Lake Iamonia where water quality is quite good.

5) During storm events, Monkey Business Tributary carries at least twice the flow of water,

containing higher concentrations of pollutants, than the rest of Lester Creek. A storm dropping an inch of rainfall can cause 60 days of dry period loading of nutrients within a few hours time.

6) Almost 10,000 ecological measurements demonstrate that Monkey Business Tributary dominates and defines the poor water quality characteristics of Lester Creek. The primary source of nutrient enrichment in Lester Cove comes from the 'Killearn Lakes Plantation Chain of Lakes' via Lake Monkey Business Tributary, not from the Talquin Sewage Treatment Facility.

The bottom of WWTP, where the seepage seemed to arise from, was refurbished. Efforts were also made by Talquin to release the waters in the Killearn Lakes Impoundment, a temporary 'lake' formed by a series of beaver dams. A dump of maintenance equipment in Golden Eagle Golf Course was removed. Shortly after the project began, Kevin Pope (former Environmental Compliance Officer for Leon County), added seven stations in Lake Iamonia to the Leon County Lakes Ecology Project, an ongoing monitoring effort by Leon County in which water quality data is collected on area lakes and added to the historical data base. This represents the first comprehensive examination of this significant water resource located in northern Leon County. Now, the actual ecology of Lake Iamonia could be examined. Due to the lack of Storm Events and further questions regarding the environmental impacts of seepage in and around the Talquin facility, a second phase of the Lester Cove Study was implemented.

The following actions were recommended to improve conditions in the Lester Cove:

1) Construction runoff into the 'Killearn Lakes Plantation Chain of Lakes' was a dominant component of the sediment load. The amount of broken ground in runoff areas needs to be minimized. The Killearn Lakes Homeowners Association has hired staff to inspect construction sites.
2) Fertilizers, raw nutrients used to stimulate lawns need to be restricted within the Lester Creek basin.
3) The ponds in the 'Killearn Lakes Plantation Chain of Lakes' are being managed to minimize aquatic vegetation, not as natural lakes or retention ponds. They have high nutrient and herbicide levels. Beneficial aquatic plants such as Fragrant Water Lilies have disappeared from the ponds. There are insufficient to no aquatic macrophytes to absorb nutrients that wash into the system. These nutrients are converted directly into algae, which wash out of the ponds and into Lake Iamonia with each storm. The ponds in the 'Killearn Lakes Plantation Chain of Lakes' are stocked with Triploid Grass Carp to control aquatic plants in all lakes as directed by the KLP Fish and Wildlife Committee. In addition, Channel Catfish have only been stocked in Lake Monkey Business for kids fishing events. These types of fish keep the ponds muddy. The control structures in some of the ponds are faulty and leak from the base. This allows the dirtiest water in the ponds to flow into Lake Iamonia. These ponds need to be excavated and deepened. They were built too shallow to maintain open water. Populations of beneficial plants need to be re-established and these ponds need to be restored and maintained as aescetically pleasing biological filters for the protection of Lake Iamonia.
4) Seepage identified at the Talquin Facility was rather minor in the potential to nutrient loading budget of Lake Iamonia. Our monitoring was highly beneficial since it led to obvious improvements in the facility. The WWTP was resurfaced. Greater retention capacity was achieved with new ponds being built after the breach, which sent treated wastewater into Golden Eagle Plantation. The Killearn Lakes Plantation Impoundment should be modified as a Stormwater Treatment Pond since it already functions in that

capacity and could assist in protecting Lake Iamonia.
Loading from Monkey Business Tributary far exceeded loading from the parts Lester Creek flowing from the Talquin Facility. In ecological matters it is always prudent to fix the obvious problem first and check to see if there really is an improvement. That is cheapest and most cost effective. The 'Killearn Lakes Plantation Chain of Lakes' are not functioning as efficient holding ponds. The 'Killearn Lakes Plantation Chain of Lakes' are currently not managed as Stormwater Retention Ponds, but as picturesque lakes, to the detriment of Lake Iamonia. Aquatic plants need to be re-established to absorb the nutrients. The northern two lakes need to be deepened so that the lakes do not become overgrown with beneficial plants once they are re-established. The amount of broken ground in runoff areas needs to be minimized. Fertilizers need to be limited within the drainage basins. After the standpipe and other associated problems are fixed, stormwater impacts need to be re-evaluated and a few more storms should be monitored. The Leon County Board of County Commissioners, the Killearn Lakes Homeowners Association, the Ochlochonee Soil and Water Conservation District, the Northwest Florida Water Management District, and the Leon County Cooperative Extension Service all interacted to make this project possible.

The proposed project has been developed in accordance with the "Florida Forever Competitive Grants Program" administered by the Northwest Florida Water Management District. The KLP lakes/stormwater ponds are degrading the southern portion of Lake Iamonia. The nutrient and sediment loading is causing the southern portion of Lake Iamonia to become eutrophic. Water quality within the KLP lakes/stormwater ponds can be dramatically improved and the treatment capacity increased by tthis project. Nutrient and sediment loading to Lake Iamonia from the KLP lakes/stormwater ponds, the major source of urban stormwater, can be reduced and eventually eliminated by this project. The KLP lakes/stormwater ponds are a prime candidate for Florida Forever program funding.

3. Does project correct existing water quality problem? ☒ Yes ☐ No

If "Yes" describe: The KLP lakes/stormwater ponds are degrading the southern portion of Lake Iamonia. The nutrient and sediment loading is causing the southern portion of Lake Iamonia to become eutrophic. Water quality within the KLP lakes/stormwater ponds can be dramatically improved and the treatment capacity increased by tthis project. Nutrient and sediment loading to Lake Iamonia from the KLP lakes/stormwater ponds, the major source of urban stormwater, can be reduced and eventually eliminated by this project. The KLP lakes/stormwater ponds are a prime candidate for Florida Forever program funding.

4. Project status: ☐ Underway ☒ Planning stage

b) How well does the project correspond to the mission, goals, priorities and strategies as specified in the District's Florida Forever Work Plan, or other District plans (e.g. District Water Management Plan, SWIM Plans, Regional Water Supply Plan)?

Lake Iamonia is on the NWFWMD SWIM priority list. The KLP Lakes are not detailed in the County Master Stormwater Plan (Theresa Heiker, personal communication). The KLP Watershed/Lake Management Plan is outlined below and in Appendix B.

Introduction:
Killearn Lakes Plantation (KLP) is a rural residential development that was initiated in the early 1970's. The Killearn Lake Homeowners Association (KLHOA) owns the KLP lakes and greenway areas. When fully developed, KLP would include more than 4,000 homes scattered throughout the rolling hills of northeast Leon County. In order for developers to acquire permits, a chain of large holding ponds or lakes was designed and created to capture stormwater runoff before it entered Lake Iamonia, a natural marsh/lake approximately 6,000 acres in surface area. The origin of these lakes/holding ponds has been described by Harper et al. (2000) . They reported aerial photography from 1937 did not show any of the current KLP lakes. Lakes Pine Hill, Petty Gulf, and Lower Diane were visible in the 1962 photos, while Upper Diane and Monkey Business were under construction at that time. Lake Arrowhead was first visible in the 1976 aerial photographs of the area. These six man-made lakes would serve as future holding/treatment ponds as well as recreational waters for future development and home sites. The estimated area of these six holding ponds/lakes is approximately 205 acres.Because of the remote location of the KLP development, sheet flow drainage and septic systems were utilized to handle stormwater and sewer during early phases (I & II) of development. Although residential constructed started in the late 1970's it was slow due to poor economic conditions and high interest rates. During the first 10 years, stormwater and sewage problems were minimal when the KLP sub-division was dominated by large undeveloped "green areas with vegetation" or drainage pathways. After the construction boom in the mid to late 1980's, flooding problems and failed septic systems began to occur as more than 25% of the project was developed with residential homes. Unfortunately, much of the land has some type of clay, which does not percolate well. The original developer and Leon County officials addressed some of the flooding problem areas on an individual basis. The stormwater and septic problems were inevitable as more people flocked to this rural northeast development as new schools were established. Modifications to the original stormwater drainage system and a new sewer system was implemented to address septic and flooding issues in newest developments. Flooding and septic problems were exacerbated by the commercial development in the Bradfordville area from the late 1990s through 2004. Drought conditions from 2000-2004 allowed continued commercial and residential development in low areas with a limited number of flooding and septic failures.Today in 2004, KLP is approaching 100% "build-out" in most units and the remaining green areas and small local holding ponds are not sufficient to handle the amount of untreated stormwater and septic runoff without significantly impacting the water quality of most lakes (See Appendix C Lake Watch Data 1993- 2003). The Lake Watch Program has provided water quality data in all lakes since 1993 and fisheries management data and recommendations has been collected by Mr. Charles Mesing. This increased stormwater runoff provides sedimentation and excessive nutrients (nitrogen and

phosphorous) to potentially grow extensive communities of aquatic macrophytes, microscopic and/or filamentous algae. Other hydrocarbon pollutants may also enter KLP lakes via stormwater/septic runoff waters. Appendix D contains a summary of the Trophic State Indices for each lake. The following is a watershed/lake management plan and a list of future needs to meet our 10-year objectives and goals. Problem statement: Development in KLP has increased significantly in the past 10 years, and consequently storm-water, sediments and nutrients entering our lakes has resulted in an overabundance of aquatic plants and or dense algae blooms, which has impacted lake aesthetics, reduced recreational activities, impacted fisheries, and degraded water quality and the quality of life for homeowners.Problems and Issues with KLP Lakes 1)The maintenance responsibility of KLP lakes has been unclear making it difficult to conduct restoration/maintenance efforts 2) Exotic aquatic vegetation has been introduced into the lakes. 3)Average water depths are generally less than 6 feet for all lakes.4)Aquatic vegetation can completely cover all lakes if left alone due to shallow water depths.5)Storm-water and septic runoff carries significant amounts of sediments and nutrients (N. P.), which fuel vegetation growth, and degrade water quality.6)Sediments have accumulated in every lake during the past 15 years.7) Silt and sediment barriers are not functioning properly in most lakes.8)Water quality has continued to degrade through out the KLP chain since1985. 9) Inadequate emergency spillways to carry excess water during significant rain events or tropical storm events.10) Silt barriers not properly installed or maintained by builders or inspected by county officials.11)Shallow water depths cannot control aquatic vegetation.12) Homeowners shoreline vegetation is often mowed to the waters edge of the lake.13) Lack of structure or habitat to provide cover for sportfish.14) Future development will continue to degrade water quality in all KLP lakes.15) Inadequate funding to address sewage and sedimentation problems.16) Garbage and trash are entering our lakes more than ever.17) No acceptable sewage and stormwater plan for KLP.18) Overfishing or harvest of largemouth bass in some lakes.19) Many lakes can't be lowered with existing old rusting structures specifically rods to open gate valves.20)Enforcement of property or buffer lines around all lakes.21)Improve areas to launch and store personal recreational boats.22)Flood control structures rust quickly and need repair every 7-10 years.23) Access for outsiders with keys is too easy. 24)Insufficient parking at all lakes.25)Garbage and trash in and around all lakes has increased in the last few years.26)Funding to address problem issues of each lake.Information and Solutions to Problems1)Develop aquatic plant and fisheries management objectives for each lake.a. Grass carp and herbicides are used to control aquatic vegetation.b.Maximum vegetation levels for all lakes. c.Maintain Grass carp every 5-7 years to meet vegetation goals.d.Herbicide use when necessary for problematic/exotic plants.e.Economic verses aesthetics values and objectives.f.Eradicate exotic plants such as Hydrilla and Water Hyacinths.g .Develop Fish Stocking strategies each lake as needed to meet objectives.h. Develop appropriate fishing regulations to meet objectives.i.Investigate whether fish are safe to consume. 2)Educate residents about the fish conservation 3)Identify, map, and inspect all silt barriers and enforcement of county permits.a) Identify sediment problem areas in each lake.b)Send letters to builders and county officials for permit violations.4) Educate our community about county permits, rules, and, regulations concerning developing properties.5)Volunteer cleanup weekends around and in the lakes.6)Volunteers to place submerged structure such as trees in deep areas of the lakes.7)Increase law enforcement throughout the community.8)Volunteer / Watch Dog group to identify permit violations within KLP.9)Inspect dams and test over flow structures on annual basis.10)Identify the desires and uses of the lakes by local residents and homeowners.11)Prioritize aquatic plant management and sediment scraping for each lake.12)Sediment could be used to create wildlife islands and or fishing peers for anglers.13)Monitoring- Annual Aquatic Vegetation and Fisheries surveys.a.Monthly Lake Watch Samples for water quality and vegetation surveys b.Annual surveys of aquatic plants and fish populations for all lakes.Objectives for Managing KLP Lakes for the Next 10 Years:1). Adaptively manage the KLP Chain of Lakes.2). Inspect and repair all dams and overflow structures to meet safety standards.3). Repair and relocate the emergency spillway on Lake

Blue Heron.3). Identify realistic aquatic plant and fishery goals for all lakes.4). Eliminate hydrilla, water hyacinths, and other exotic plants from the lakes.5). Remove sediments in lakes, which impact their ability to function properly. 6). Improve water quality and nutrient loads entering all lakes.7). Improve fish habitats with adding structure to all lakes 8). Develop and implement a sediment management strategy for all lakes.9). Improve vegetated lakes edges and littoral zones when ever feasible.10) Construct fishing piers from excess sediments in the lakes when feasible.11). Reduce the amount of sediments entering the lakes with properly functioning silt barriers, small catch basins, swells or ditches where feasible.12). Lobby for a new sewage system and more efficient stormwater system to reduce sediments from entering the lakes.13) Improve the number, health and condition of the sportfish communities.*It should be noted that the KLHOA plans to continue to update and enhance the KLP watershed/ Lake Management Plan in the upcoming years 2004 – 2005 according to the process outlined by VanDyke, 1994.

c) What is the impact of the problem to be addressed by the proposed project on water resources? What is the classification of the receiving waterbody? Does the waterbody have any special designations such as Outstanding Florida Water, State Aquatic Preserve, etc.?

The Killearn Lakes Watershed drains into Lake Iamonia through both Cromartie Arm and Lester Cove. Lake Iamonia is an Outstanding Florida Waterbody (OFW). The Kilearn Chain of Lakes are technically stormwater treatment facilites but they have been maintained as recreational lakes for fisheries. These stormwater treatment facilites are the major input of urban stormwater into Lake Iamonia (an OFW) degrading drainage areas in Lake Iamonia and contributing to eutrophication. The Killearn Chain of Lakes are stormwater treatment facilities that have little, if any treatment capacity. Nutrient loading and sedimentation in Lake Iamonia is causing nutrient enrichment, excessive sedimentation, the prolific growth of aquatic vegetation and microalgae. This project will increase the stormwater treatmant capacity of the Killearn Chain of Lakes, reduce nutrient loading to Lake Iamonia and protect that Outstanding Florida Waterbody from further degradation. Lake Iamonia is currently scheduled for a TMDL in 2007. This grant will decrease nutrient loading, reducing the nutrient load in Lake Iamonia and address TMDL concerns before the actual implemantation date of the TMDL.

Another portion of the Killearn Lakes Watershed drains into Lake Jackson at Fords Arm. Lake Jackson is both an OFW and an Aquatic Preserve. The nutrient load imparted by this drainage to Lake Jackson is as yet unquantified, but the increased nutrient removal capacity within the watershed imparted by this grant will benefit the Lake Jackson Watershed (Lake Jackson is also scheduled for a TMDL and nutrient reduction would be beneficial).

d) Does the project offer cost-sharing and how much? Is the project a cooperative effort with more than one entity? (If there are other entities participating in cost-share, evidence of commitments from them should be provided). Has the project, or some tasks/phases of the project, received District funding in the past? Does the project receive funding from another state or federal agency? Has the applicant established a stable, dedicated funding source, and are funding mechanisms in place or planned? The applicant needs to provide evidence of project funding.

1. Cost-sharing: ☒ Yes ☐ No Amount (if any): $247,000

2. Cooperative project: ☒ Yes ☐ No

If "Yes," please provide evidence of cost-share commitments:

1) The letter outlining the County cost share commitment is included in Appendix E.
2) The KLHOA has a reserve amount in the KLHOA budget of $100,000 directed to lake management activities. The KLHOA has been fully operational since 1984, and the KLHOA Fish and Wildlife Committee has been active since 1986. The KLHOA have given a verbal agreement (Brad Trotman, Director, KLHOA, personal communication) that these monies (collected from dues, etc..), estimated at $10,000 - $20,000 per year, would be directed towards the lake operation and maintenance efforts.

3. Past District funding: ☐ Yes ☒ No 5. Other agency Funding: ☐ Yes ☒ No

4. Dedicated funding source: ☐ Yes ☒ No 6. Funding: ☒ In Place ☒ Planned

Evidence of project funding:

The KLHOA has a reserve amount in the KLHOA budget of $100,000 directed to lake management activities. The KLHOA has been fully operational since 1984, and the KLHOA Fish and Wildlife Committee has been active since 1986. The KLHOA have given a verbal agreement (Brad Trotman, Director, KLHOA, personal communication) that these monies (collected from dues, etc..), estimated at $10,000 - $20,000 per year, would be directed towards the lake operation and maintenance efforts.

e) Will the proposed project require permits from the District and/or other government agencies? If "yes," explain the type of permit required and the estimated time frame needed to secure the permit. What is the estimated time that is required to complete the entire project or the portion of the project that requires cost-share? (If this project has more than one task, the District would not cost-share those sections of the project already underway.)

1. Permits required? ☒ Yes ☐ No

Type and time frame (if "Yes"):

Dredge and Fill Permit (County; Joe Brown, Leon County Public Works County Engineer, personal communication, see budget for estimated cost) and a Muck removal permit (DEP). Estimated time to obtain permits: from one to three months

2. Estimated time to complete project (or project portion): 12 months

f) Please provide a brief work plan including:

1. Major tasks to be accomplished:

Project Objectives:
1) Improve the stormwater treatment capabilities of KLP lakes that flow into Lake Iamonia.
2) Assess the results of lake restoration activities.
3) Determine the need, feasibility (economic and aesthetic) for additional restoration activities and NPS BMP installation.
4) Prepare documentation of the restoration efforts that can be used to assess the applicability of these techniques in other watersheds

Project Description

The major components of the proposed project are outlined below:

Control Structure Retrofit
The control structures between the lakes will be upgraded and optimized for sediment and nutrient removal. Lake Blue Heron's emergency spillway will be replaced as it is highly degraded. Other control structures to be upgraded will be standpipes located in Lake Monkey Business and Lake Blue Heron. The estimated annual mass of pollutants removed is included in the "Estimated Pollutant Load Reduction" section.

Catch Basin(s)
Four catch basins will be constructed/implemented (3 on Lake Blue Heron and 1 on Lake Monkey Business). The suggested catch basin type would be an exfiltration trench. Exfiltration trenches should be designed as "off-line" systems which include a weir overflow structure or a diversion sometimes called a "smart box". The purpose of these trenches is the retain the "first flush" of stormwater runoff to promote water quality improvements, to reduce the runoff volume and peak discharge rate from a site, and to filter contaminants out of runoff before they reach receiving waters.

Sediment Removal
Sediments will be removed from Lake Blue Heron (draining will occur prior to sediment removal) and Lake Monkey Business. It is estimated that at least 47,778 yds3 (or 30 acres of sediments, 1 ft depth) will be removed from Lake Blue Heron and Lake Monkey Business. The focus of sediment removal will be near discharge pipes. Sediment scraping and removal priorities will be given to lakes where water control structures and or emergency spillways need retrofitted for safety. The proper permits (DEP and County) will be secured, and the sediments will be analyzed accordingly. It is hoped that the sediments will be used to create an island wildlife sanctuary within Lake Blue Heron, and for berm construction. The remainder of sediments or "muck" will be disposed of in a proximal and suitable site. Subsequent to the sediment removal, these lakes will be replanted and maintained as naturally vegetated Florida lakes for a minimum of two years at which time the KLH will re-evaluate and approve a more permanent lake management plan. Beneficial aquatic plants and shoreline buffers will be planted in and around these two waterbodies.

Artificial Marsh and Buffer Zones
Artificial Marshes will be constructed between each of the Killearn Lakes to remove nutrients and sediment as the water flows from lake to lake to Lake Iamonia. Shoreline buffers will be planted around all the lakes (Arrowhead, Petty Gulf, Pine Hill, Diane, Lake Blue Heron and Lake Monkey Business). Only beneficial aquatic vegetation will be utilized. Initial plantings will include species such as Maidencane (Panicum hemitomon), Soft Stem Bulrush (Scirpus validus). Lemon Bocapa (Bacopa caroliniana), Arrowhead (Sagittaria), Blue Flag Iris, and Canna flaccida (Yellow Canna), among many others. The first phase of aquatic plantings will focus on continuous blooming emergent aquatic plants as a means of easing homeowner acceptability of aquatic plants around and in their lakes.

Small canal/coves in the upper end of Blue Heron could be "fenced off" with parallel PVC pipes attached to 4x4 posts which would keep grass carp from this newly created artificial marshes allowing significant stands of beneficial aquatic macrophytes (as listed previously). These "mini wetland areas" will help filter incoming stormwater discharges, establishing a "mini wetland" area in the confined canals, which receive most of the stormwater discharge and sediments. This design used to confine grass carp to designated areas would also be applicable on Lake Monkey Business, Lake Diane, and possibly Lake Pettygulf. Most of these high stormwater discharge areas do not have many lakefront residences. This concept is more sellable to KLHOA members and should be the most beneficial and cost effective BMPs we are suggesting. Maintenance responsibilities will be handled by the KLHOA, who will make use of their cadre of volunteers. Volunteers will also be recruited through the education outreach efforts.

Berm and Swale Construction
Sediments removed from Lake Blue Heron and Lake Monkey Business will be used to construct berms parallel to the direction of stormwater flow will be placed in the grassy swales draining sheetflow into the KLP Lakes. Planning and community input will be the first phase of berm construction. The exact locations of berms will be determined, and will involve a combination of private property and KLHOA "greenways" areas. Around Lake Blue Heron, the Golden Eagle Golf Course has made a preliminary agreement to allocate at least 1,000 feet to berm construction. Berms will be gently sloping in design and include cordgrass planting.

The following areas have been identified as potential berm/swale sites (distinguished by greenway/public and private property areas):
Lake Blue Heron: 1,500 feet greenway and 4 acres of private property
Lake Pine Hill: 1,200 feet greenway and 20 acres of private property

Arrowhead: 1,500 feet greenway and 6.5 acres of private property
Petty Gulf: 1,075 feet greenway and 8 acres private property
Monkey Business: 750 feet greenway and 3 acres of private property; in addition there are 50 potential private acres along Lester Creek that flows directly into Lake Iamonia.

Establishing Grassy Pathways to Lakes
Many roads and pathways leading to our lakes do not have adequate grassy vegetation to filter stormwater heading into the lakes. These pathways need sod to slow the stormwater and help filter the larger sized particulate materials before they enter the KLP lakes. Maintenance activities will be conducted by KLHOA.

Rain Gardens
Areas immediately upstream from the berms and along lakefront residential properties will potentially be planted with vegetation that can help filter the stormwater. These will be incorporated and managed as part of the shoreline buffer zone system. Similar to the shoreline buffer zones, maintenance responsibilities will be handled by the KLHOA.

Public Education
1) Town meetings and workshops – Public workshops will be held to educate the residents of the watershed about personal BMPS for pollution reduction and habitat improvement, as well as techniques and technical assistance for development and maintenance of personal shoreline buffer zones and rain gardens. The Leon County Extension Service and tappwater.org has agreed to facilitate the public outreach workshops.
2) Evaluation of the potential for improvement of community access. The potential for improved public access will serve as a means of enhancing a community sense of shared ownership and stewardship.
3) Educational materials including brochures, newsletters and CDs, signage, communication on radio and television, will be disseminated to educate the residents of the watershed on BMPs for residential communities. The KHOA volunteers will be responsible for the newsletter and brochures and the volunteer recruitment effort for the shoreline buffer zone program.

Monitoring
Over the one-year period, monitoring will be performed to monitor the effectiveness of NPS reduction along with the 6 original stations that will be sampled once a month. The remaining monitoring activities including sediment quality, biology (aquatic macrophytes and fish population surveys) and stormwater loading are outlined in Appendix F.

It should be noted that for KLP Sewer System Units - I & II:
The KLHOA Executive Director has been communicating with Talquin Electric and Leon County to assist in securing funding to complete a KLP community wide Sewage System for the older KLP Units I & II. These units are currently on septic systems and many of the homes are 15-20 years old. Many homes at the lower elevations have experienced problems with flooding and failed systems during the past 10 years, with KLP1 currently experiencing a 33% failure rate and KLP2 a 5% failure rate of septic systems (John Kraynak, Director Environmental Compliance Division, Leon County, personal communication). Areas of high septic tank failure have been identified by the KLP director and solutions to this problem are being discussed with county officials who permitted and modified the stormwater drainage and septic systems.

2. Milestones:

Task/Activity	Start	Complete
Grant Award	Month 1	Month 12
Permitting, draining Blue Heron and Monkey Business	Month 1	Month 6
BMP Survey and Design	Month 1,2	Month 4
Public Education (continuous)	Month 1	Month 12
Submit Invoices	Month 1	Month 12
Prepare and submit quarterly reports	Quarterly	
BMP Implementation/Construction	Month 4,5,6	Month 12
Monitoring (water quality)	Monthly	
Monitoring (sediment and stormwater)	Month 4	Month 12
Prepare and submit draft project report	Month 11	Month 12
Incorporate NWFWMD comments, prepare and submit final project report	Month 12	Month 12

3. Deliverables:

·Final report* which documents:
·Lakewide water quality and ecological conditions, compared to historical conditions.
·Stormwater loading from primary tributaries.
·Treatment efficiency of BMPs.

And includes recommendations for:
·Further in-lake restoration, if applicable.
·Stormwater pollutant load reduction goals.
·Additional stormwater BMP installation.
·Other management activities.
·Utilization of these restoration techniques in other waterbodies.
·Quarterly Progress Reports
·Water quality and ecological data appendix, including hard and electronic copies
·Provision of all applicable water quality data for upload to STORET

*5 hard copies, plus electronic copies in .pdf and MS Word format

g) Please indicate whether the applicant qualifies as a small community as defined herein.*

☐ Qualifies ☒ Does not qualify

* For the purposes of this grant, a small community is defined as:

1. A county with a population of 75,000 or less;
2. A municipality within a county described in subparagraph 1.
3. Any incorporated community with a population of 10,000 or less.

8. Budget

Provide a detailed, itemized project budget by **tasks**, their **associated costs**, and **funding obligation** of the proposed funding entity. The applicant shall identify whether the proposed work is done **in-house or contractual** and **how the grant money will be spent** and whether the **applicant's share is cash or in-kind services (see table, below).**

See table below.

Note: Construction costs will include sediment removal and BMP construction (including 4 exfiltration trenches, berms and swales, mini-wetland, and aquatic plantings). The proposed work will be a combination of effort, both in-house (surveying, design and permitting) and contractual (sediment removal and BMP construction).

The education component will involve tappwater.org and the Leon County Extension Service, and is estimated at $20,000. The monitoring component will be contractual and is estimated at $75,000. The staff component will be the KLHOA and is estimated at $5,000. There will be $2,000 allocated for materials and supplies. The education, monitoring, and staff components will be funded from the match source (Leon County), yielding a total of $102,000.

GRANT PROJECT BUDGET TABLE

PROJECT: Killearn Lakes Plantation Restoration: Clean Lakes Project

APPLICANT: Leon County

Budget by Task	NWFWMD Grant	Matching Funds	Source[3]
1) Design		20,000	County
2) Surveying		10,000	County
3) Permitting		20,000	County
4) Land Acquisition (or value)[2]		0	0
5) Construction	332,000	95,000	County *See Appendix G for Sediment Removal Costs
6) Other (Specify)		102,000*	County *For Education, Monitoring and Staff Time
Total	332,000	247,000	County

Notes:

(1) All non-construction costs shall be paid by applicant. NWFWMD grant funds shall only be used for construction activities.
(2) Acres acquired or perpetually conserved and cost or estimated value.
(3) Describe if in-kind match.

Return two (2) paper copies and one (1) electronic file MS Word (CD or disc) to:

Paul Thorpe
NWFWMD

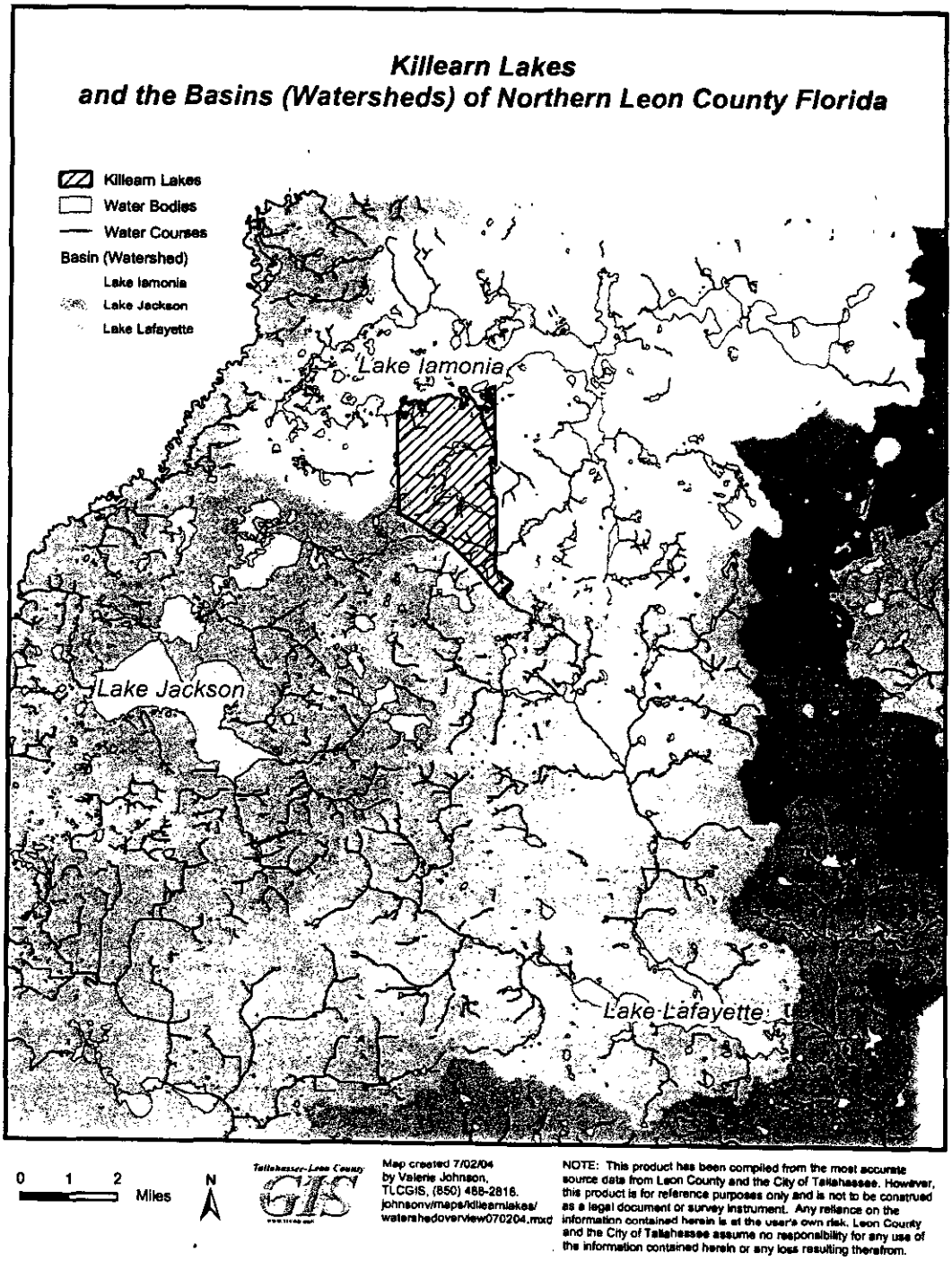
81 Water Management Dr.
Havana, FL 32333

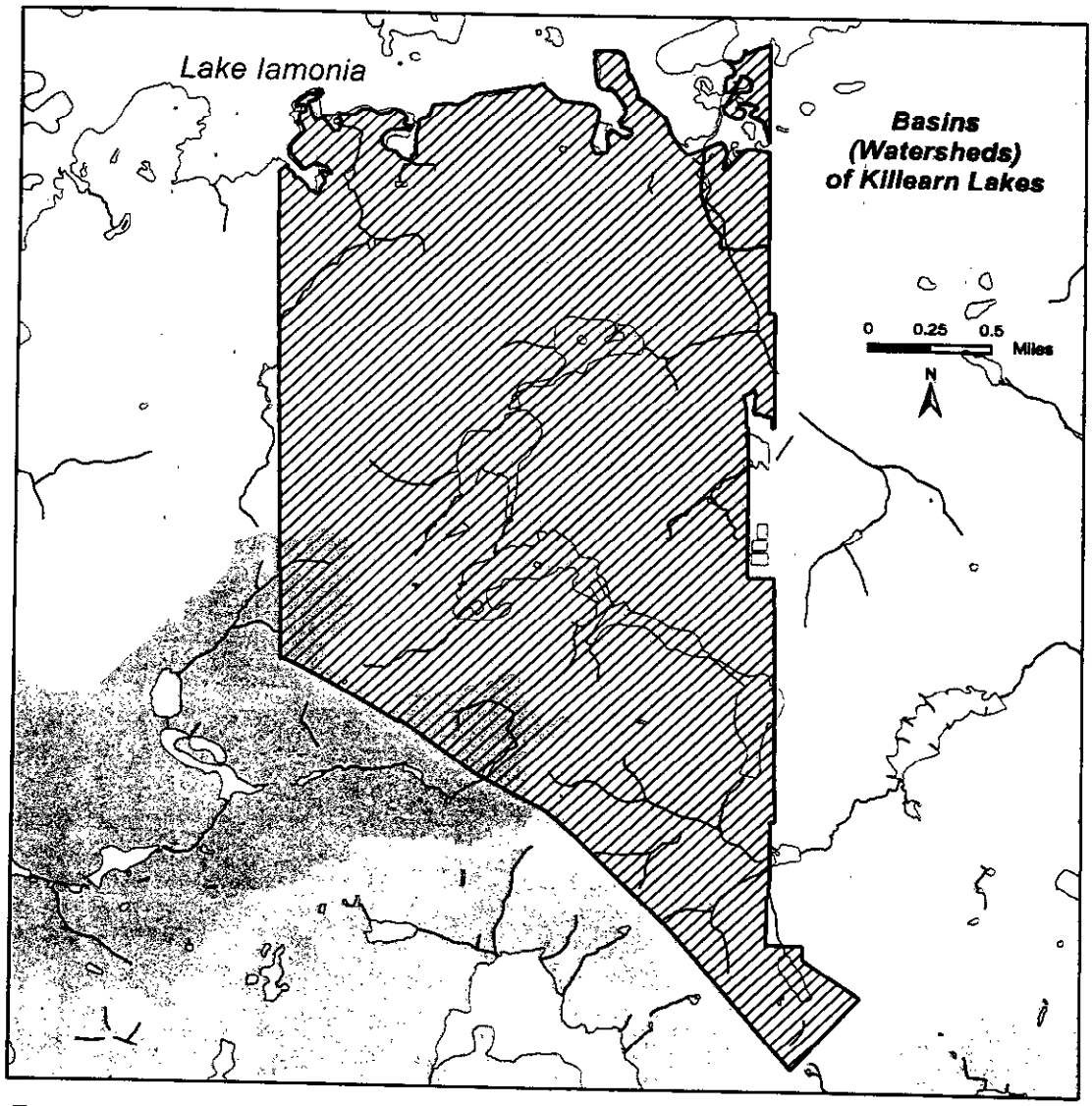
Applications must be received at District Headquarters by 3:00 PM EDT on Tuesday, October 5, 2004 for consideration.

APPENDIX A

The Killearn Lakes Plantation Chain of Lakes

GIS Maps and Land Use Area(s)


Killearn Lakes
and the Basins (Watersheds) of Northern Leon County Florida
Killearn Lakes
Water Bodies
Water Courses
Basin (Watershed)
Lake Iamonia
Lake Jackson
Lake Lafayette
Lake Iamonia
Lake Jackson
Lake Lafayette
0 1 2
Miles
N
Tallahassee-Leon County GIS
Map created 7/02/04
by Valerie Johnson,
TLCGIS, (850) 488-2816.
johnsonv/maps/killearnlakes/
watershedoverview070204.mxd
NOTE: This product has been compiled from the most accurate source data from Leon County and the City of Tallahassee. However, this product is for reference purposes only and is not to be construed as a legal document or survey instrument. Any reliance on the information contained herein is at the user's own risk. Leon County and the City of Tallahassee assume no responsibility for any use of the information contained herein or any loss resulting therefrom.



The Killearn Lakes area covers 4,003 acres.
It falls in part of three different basins (watersheds).
The following table shows how much of the subdivision falls in each of these three basins.

BASIN	AREA (SQ FT)	ACREAGE
LAKE IAMONIA	160,772,714	3,690.8
LAKE JACKSON	10,383,217	238.3
LAKE LAFAYETTE	360,040	8.2

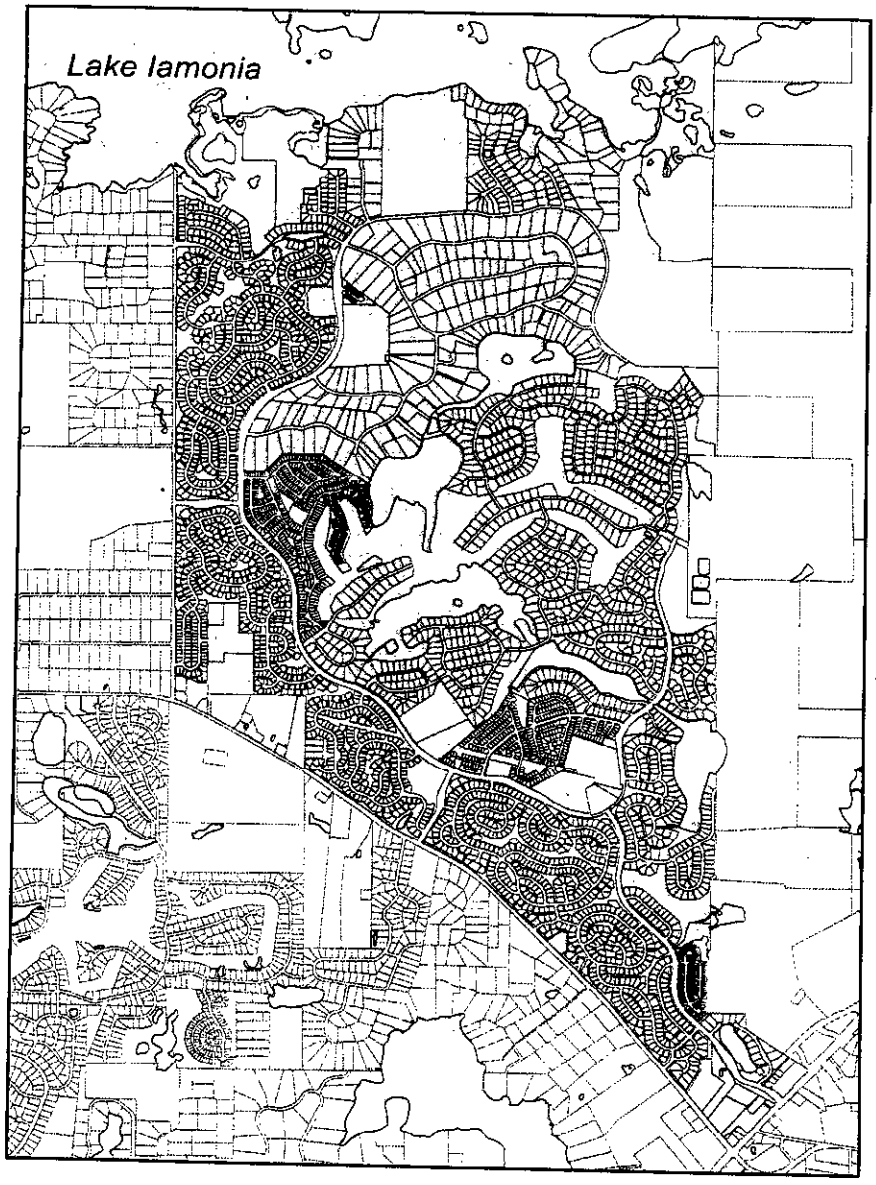
(Note: 1 Acre = 43,560 sq ft)

Killearn Lakes
Water Bodies
Water Courses
Basin (Watershed)
Lake Iamonia
Lake Jackson
Lake Lafayette

Tallahassee-Leon County GIS

Map created 7/02/04
by Valerie Johnson,
TLCGIS, (850) 488-2818.
johnsonv/maps/killearnlakes/
watershedinfo070204.mxd

NOTE: This product has been compiled from the most accurate source data from Leon County and the City of Tallahassee. However, this product is for reference purposes only and is not to be construed as a legal document or survey instrument. Any reliance on the information contained herein is at the user's own risk. Leon County and the City of Tallahassee assume no responsibility for any use of the information contained herein or any loss resulting therefrom.



Revised Boundary of "Killearn Lakes"

0 0.25 0.5 Miles

N

Water Bodies
killearnlakesdri
parnal

Tallahassee-Leon County GIS

Map created 7/1/04
by Valerie Johnson,
TLCGIS, (850) 488-2618,
johnsonv/maps/killearnlakes/
subdivinfo.mxd

NOTE: This product has been compiled from the most accurate source data from Leon County and the City of Tallahassee. However, this product is for reference purposes only and is not to be construed as a legal document or survey instrument. Any reliance on the information contained herein is at the user's own risk. Leon County and the City of Tallahassee assume no responsibility for any use of the information contained herein or any loss resulting therefrom.

APPENDIX B

Summary and Description of Killearn Lakes Plantation and Lake Management Plan

Lake Arrowhead- has high numbers of yoy threadfin shad and good numbers of smaller sized largemouth bass and bluegill. The panfish (bluegill and shellcracker) population is dominated by intermediate sized fish. Several large golden shiners, 7-8 inches, were observed in 2003-04. There is a significant lack of fish habitat or structure in the lake. Sediments/silt are still coming into both ends of the lake from storm water runoff discharge pipes. There are large plumes of sand/silt in front of two primary pipes entering the lake. Dense microscopic algae dominate the aquatic plant life. This lake experiences period dense algae blooms in late spring or early summer. A fish kill occurred on July 14, 1998 when dissolved oxygen levels dipped below 1.5 ppm. Water levels were slightly lower in 2003 and aquatic vegetation, Pennywort and Chara are beginning to return to shore. There are no immediate aquatic vegetation problems at this time. Two stems of hydrilla, exotic submersed vegetation, were found Oct 5, 2002. There have been no other hydrilla observations since fall of 2002. This lake is a candidate for a future aeration system or fountain, which may be helpful in the future. Average water depth is < 5 feet. The potential for 100% aquatic vegetation coverage is very high without grass carp. The last stocking of triploid grass carp (N = 100) occurred in February 1995 (Table 1).

Needs: Sediment removal in at least two plume areas beneath discharge pipes.
Consider re-stocking 70 – 100 grass carp in 2004-05.
Introduce cover in the form of anchored oak trees.
Fishery potential is good for catch and release of smaller sized bass.
The gate valve rod of the overflow structure needs replaced.
Flooding over the dam occurs during heavy rains and grass carp and other fish may escape into the wooded wetland.
Maintain the kids fishing dock and parking for recreational users.
Bluegill should be fed with artificial catfish feed from docks.
Develop Sediment Management Plan including drawdown time frames.
Secure funding for sewage and a modified storm water system.

Lake Pine Hill has low numbers of all fish species except for golden shiners. Numbers and size of bass, bluegill, and redear sunfish are improving based on preliminary fishery data in 2004. Largemouth bass weights and general conditions are poor. Lake Pine Hill has the best over all water quality in the chain of lakes with respect to low nutrient levels. Water clarity is usually greater than 5 feet. *Chara* (algae) covers 60 –70 % of the lake bottom, some lily pads are returning (*Nymphaea, Nuphar spp. and, Brasenia*, or water shield) to the littoral zone. *Lemon bacopa* is established in much of the littoral zone shoreline. A 3-5 foot band of torpedo grass *(Panicum repens*) has become well established around the shoreline of the lake and provides some cover for juvenile bass and forage fish such as golden shiners. Small amounts of hydrilla are found but confined to the southern end where Pine Hill connects to Pettygulf. Threadfin shad have disappeared since 2002. There are good numbers of adult shellcrackers and golden shiners. Aquatic vegetation coverage (primarily Chara and Lemon Bacopa) have increased significantly from < 20% to 60% coverage since 2001. The average water depth is < 5 feet. Potential for 100% aquatic vegetation coverage is very high. The last triploid grass carp (N = 100) were stocked in October 2002 (Table

1). This lake is bordered and protected by a large plantation, which has remained relatively undeveloped through May 2004.

Needs: Introduce cover in the form of anchored oak trees.
Fishery potential is average for smaller sized bass and bluegill
Over-flow structure is extremely old and should not be opened.
Monitor expanding aquatic plants such as torpedo grass and hydrilla.
The canal leading to Lake Pettygulf may need to be dredged eventually on both sides of the Deer Lake Road.
Lake Pine Hill Park has no fishing access to deep water.
Bluegill should be fed with artificial catfish feed from docks.
Funding for a new sewage and modified storm water system.

Petty Gulf has the exotic plant, hydrilla, which became established in 2000. It was successfully treated with the herbicide Sonar in May of 2000 and again in 2002. Hydrilla was found growing in 13 feet of water and covering up to 80% of the surface area of the lake in 2000 and 2002. Insufficient numbers of grass carp (< 10/acre) were unable to control the re-growth of hydrilla in 2001. In 2002, many homeowners complained again about dense plant coverage, aesthetics, and poor recreational opportunities on the lake. During 2004, other aquatic plant species observed included torpedo grass, southern naiad, Chara, lemon bacopa, and water hyacinths.

Pettygulf has high numbers of small and intermediated size bass (7-15 inches) along with high numbers of 2-6 inch bluegill, golden shiners, observed along the torpedo grass in 2003-04. Bass and bream population are average, and the young of year (yoy) golden shiners and bass are numerous because of the extensive vegetation. Recreational opportunities will increase if the grass carp can control the hydrilla re-growth. Submersed structure or fallen trees are needed as fishery habitat. Several 5-12 lb carp were observed during sampling. No threadfin shad were observed in 2003 and 2004.

A small number of water hyacinths, another exotic plant, were observed near the dam in 2003. These purpled flowering floating plants were treated and removed. However, in 2004 these nusiance plants returned and were lightly scattered around the shoreline of the lake. A small herbicide treatment (2 4-D) for water hyacinths was completed in August 2002 and again in May 2004. The last stocking of triploid grass carp (N = 300) occurred in November 2001 (Table 1). Storm water runoff from the far end of the lake carries high sediments loads and trash into the lake from the latest development in the area. Hydrilla is also being discharged into the 85 acre Lake Diane during high flow rain events. Future costs to control hydrilla with Sonar in all lakes could be $10,000 or more on a regular schedule. We are currently getting about a 2-year control period for each Sonar treatment in Lake Petty Gulf. Unfortunately, hydrilla appears to be resistant to Sonar after repeated treatments in other systems. High numbers of triploid grass carp remains a viable option to control hydrilla in the future. Average water depth is > 6 feet with depths up to 14 feet near the dam. Hydrilla has the potential to cover 80% of the lake's surface area.

Needs: Confine hydrilla to Lake Petty Gulf if possible and manage when feasible.
Reduce the amount of sediments entering the lake.
Introduce cover in the form of anchored oak trees.
The gate valve rod of the overflow structure needs replaced.
Closely monitor hydrilla abundance and distribution in 2004
Shad may need to be re-introduced if hydrilla is kept under control.
Maintain a clean overflow structure so trash does not clog the opening.
The canal connected to Pine Hill may need dredged soon.
Sediments accumulate below the two large discharge pipes and a maintenance plan should be developed.
Bluegill should be fed with artificial catfish feed.
Sewage and modified storm water system.
Fishing access for young anglers.

Blue Heron – Fishery is declining due to the lack of cover and increased sediment and trash entering the lake. The two canals draining the Golden Eagle golf course are rapidly filling in with sediments and nutrients. Filamentous algae is the dominant aquatic vegetation throughout most of the lake in May 2004. Recent drought conditions and significant nutrients from storm water runoff have caused these conditions.

Low numbers of all fish species were observed in 2003 and 2004. Largemouth bass are in poor condition and bluegill are restricted to areas with a few small overhanging limbs or sunken trees. Water clarity has increased due to filamentous algae covering most of the lake bottom. Triploid grass carp were last stocked in December 1996 (N = 250). Potential for 100% aquatic vegetation coverage is very high. Historically southern naiad has historically covered up to 80% of the lake prior to triploid grass carp introduction in 1987. The average water depth < 6 feet. Water depths below discharge pipes range from 2 inches to 2 feet deep. These areas support aquatic vegetation and filamentous algae.

Needs: Lake Blue Heron has the most sediment accumulation from storm water runoff and it may be loosing capacity to function as a holding pond.
Emergency spillway needs to be moved and replaced with concrete.
The gate valve rod on the over flow structure needs replaced.
The discharge pipe through the dam is eroded on the backside.
Remove sediment plumes near all new discharge pipes.
Additional grass carp may be needed in the near future (2004-05).
Introduce cover in the form of anchored oak trees.
Develop a Sediment Management Plan for the near future.
Bluegill should be fed with artificial catfish feed from docks.
Funding for a new sewage and modified storm water system.
Fishing access for young anglers.

Lake Monkey Business has good numbers of yoy bass, shad, and bluegill hiding in the limited number of trees and submersed logs.. Several 1-5 inch black crappie were

observed during samples. These fish compete with bass for food. Adult threadfin shad numbers are good. We observed only a few grass carp. Good numbers of smaller sized bass and catfish are distributed near structure and or homeowners docks. Channel catfish have become established from annual stockings for the Kids Fishing Events.

Filamentous algae is growing along the shallow shoreline and it has increased since 2001. Lake Monkey Business has a high recreational usage by residents and friends. Limited shoreline aquatic plants are returning. Triploid grass carp have get the aquatic plants low and 200 grass carp were last released in October 2002. The average water depth of Monkey Business is < 6 feet and future plant expansion is very high without grass carp.

Needs: Sediments need to be removed near the discharge pipes.
Over-flow gate valve rod needs replaced.
The leak in main overflow discharge pipe needs repaired.
Discharge pipe is eroded on the backside of dam.
Introduce cover in the form of anchored oak trees.
Emergency spill way should be re-evaluated.
Bluegill should be fed with artificial catfish feed from docks.
Funding for sewage and modified storm water system.
Silt barriers are not functioning properly and should be repaired or removed.

APPENDIX C

Lake Watch Data Killearn Lakes Plantation (2003 Only)

Lake	Date	Station	TP (µg/L)	TN (µg/L)	CHL A (µg/L)	SECCHI (ft)	SECCHI 2
Arrowhead	1/26/2003	1	55	640	58	1.1	
Arrowhead	1/26/2003	2	66	780	52	1.1	
Arrowhead	1/26/2003	3.	.		63	1.1	
Arrowhead	2/28/2003	1	66	830	39	1.2	
Arrowhead	2/28/2003	2	58	870	77	1.2	
Arrowhead	2/28/2003	3	75	1010	64	1.2	
Arrowhead	3/25/2003	1	39	610	32	1.1	
Arrowhead	3/25/2003	2	40	590	31	1.1	
Arrowhead	3/25/2003	3	75	720	31	1.1	
Arrowhead	4/30/2003	1	32	750	12	1.8	
Arrowhead	4/30/2003	2	29	680	10	1.7	
Arrowhead	4/30/2003	3	34	740	15	1.8	
Arrowhead	5/28/2003	1	36	670	28	2.3	
Arrowhead	5/28/2003	2	36	680	27	2.3	
Arrowhead	5/28/2003	3	38	690	26	2.2	
Arrowhead	6/26/2003	1	31	570	16	2.9	
Arrowhead	6/26/2003	2	29	670	17	2.9	
Arrowhead	6/26/2003	3	34	470	17	2.9	
Arrowhead	7/27/2003	1	33	600	17	3.1	
Arrowhead	7/27/2003	2	33	500	17	3.1	
Arrowhead	7/27/2003	3	32	610	16	3.1	
Arrowhead	8/31/2003	1	19	370	5	5	
Arrowhead	8/31/2003	2	20	290	6	5.5	
Arrowhead	8/31/2003	3	20	520	5	5	
Arrowhead	9/30/2003	1	30	580	17	3	
Arrowhead	9/30/2003	2	32	440	16	3.1	
Arrowhead	9/30/2003	3	31	560	24	3	
Arrowhead	10/31/2003	1	34	680	34	1.5	
Arrowhead	10/31/2003	2	37	730	37	1.4	
Arrowhead	10/31/2003	3	39	620	36	1.5	
Arrowhead	11/30/2003	1	40	680	34	2	
Arrowhead	11/30/2003	2	46	690	33	2	
Arrowhead	11/30/2003	3	43	690	33	2	
Arrowhead	12/31/2003	1	48	840	33	1.2	
Arrowhead	12/31/2003	2	55	980	40	1.2	
Arrowhead	12/31/2003	3	53	900	40	1.2	
Arrowhead-algae bloom	12/21/1997	1.	.		558.	.	

Lake	Date	Station	TP (µg/L)	TN (µg/L)	CHL A (µg/L)	SECCHI (ft)	SECCHI 2
Blue Heron	1/19/2003	1	37	650	18	2.5	
Blue Heron	1/19/2003	2	38	620	17	2.5	
Blue Heron	1/19/2003	3	37	580	15	2.5	
Blue Heron	2/15/2003	1	46	1150	63	1.4	
Blue Heron	2/15/2003	2	46	980	65	1.5	

Blue Heron	2/15/2003	3	48	1110	64	1.5
Blue Heron	3/22/2003	1	47	970	75	1.5
Blue Heron	3/22/2003	2	43	960	74	1.5
Blue Heron	3/22/2003	3	45	920	67	1.5
Blue Heron	4/20/2003	1	36	470	16.	
Blue Heron	4/20/2003	2	33	590	15	3
Blue Heron	4/20/2003	3	35	530	14	2.5
Blue Heron	5/18/2003	1	35	550	16	3.3
Blue Heron	5/18/2003	2	37	560	17	3.3
Blue Heron	5/18/2003	3	38	520	14	2.7
Blue Heron	6/15/2003	1	41	560	13	3.3
Blue Heron	6/15/2003	2	39	590	15	3.3
Blue Heron	6/15/2003	3	41	590	13	3.3
Blue Heron	7/20/2003	1	38	560	14	2.8
Blue Heron	7/20/2003	2	43	510	13	2.5
Blue Heron	7/20/2003	3	41	520	14	2.5
Blue Heron	8/16/2003	1	28	460	12	4.2
Blue Heron	8/16/2003	2	41	510	15	2.7
Blue Heron	8/16/2003	3	45	430	11	1.6
Blue Heron	9/7/2003	1	32	380	15	3.6
Blue Heron	9/7/2003	2	36	530	16	3.6
Blue Heron	9/7/2003	3	36	500	14	3.6
Blue Heron	10/12/2003	1	41	590	18	2.8
Blue Heron	10/12/2003	2	41	620	18	2.8
Blue Heron	10/12/2003	3	45	660	18	2.3
Blue Heron	11/23/2003	1	37	560	15	2.7
Blue Heron	11/23/2003	2	41	550	12	3
Blue Heron	11/23/2003	3	54	600	14	2.7
Blue Heron	12/14/2003	1	40	590	4.	Bottom(5.5)
Blue Heron	12/14/2003	2	38	520	4.	Bottom(4.5)
Blue Heron	12/14/2003	3	43	500	5.	Bottom(4.0)

Lake	Date	Station	TP (µg/L)	TN (µg/L)	CHL A (µg/L)	SECCHI (ft)	SECCHI 2
Diane	1/15/2003	1	19	450	3	9	
Diane	1/15/2003	2	21	490	3	8	
Diane	1/15/2003	3	16	410	3	7.5	
Diane	2/24/2003	1	16	400	2	6	
Diane	2/24/2003	2	17	380	2	6	
Diane	2/24/2003	3	18	510	2	6	
Diane	3/24/2003	1	18	600	3	7	
Diane	3/24/2003	2	19	500	3	7	
Diane	3/24/2003	3	16	400	4	7	
Diane	4/24/2003	1	15	400	4	7	
Diane	4/24/2003	2	16	350	5	6.5	
Diane	4/24/2003	3	15	330	5	6.5	
Diane	5/19/2003	1	10	290	3.	Bottom(10.0)	
Diane	5/19/2003	2	11	290	3	11	
Diane	5/19/2003	3	10	290	3.	Bottom(9.0)	

Diane	6/16/2003	1	12	310	2.	Bottom(10.0)
Diane	6/16/2003	2	13	320	2	11
Diane	6/16/2003	3	12	360	2.	Bottom(9.0)
Diane	7/14/2003	1	15	580	9	7.5
Diane	7/14/2003	2	16	600	8	8
Diane	7/14/2003	3	13	440	7	7.5
Diane	8/11/2003	1	15	260	8	7
Diane	8/11/2003	2	14	310	6	7
Diane	8/11/2003	3	18	300	8	6.5
Diane	9/15/2003	1	14	430	6	6
Diane	9/15/2003	2	18	360	7	6
Diane	9/15/2003	3	18	390	7	6
Diane	10/23/2003	1	24	530	7	7
Diane	10/23/2003	2	20	430	7	7
Diane	10/23/2003	3	20	480	8	6
Diane	11/17/2003	1	21	620	10	6
Diane	11/17/2003	2	20	740	9	6
Diane	11/17/2003	3	17	610	10	6
Diane	12/19/2003	1	22	530	14	4.5
Diane	12/19/2003	2	24	610	13	4.5
Diane	12/19/2003	3	34	600	13	4.5
Diane-spillway	6/20/2000	1	56	1100.	.	.

Lake	Date	Station	TP (µg/L)	TN (µg/L)	CHL A (µg/L)	SECCHI (ft)	SECCHI 2
Monkey Business	2/23/2003	1	56	970	43	2	
Monkey Business	2/23/2003	2	53	950	44	2	
Monkey Business	2/23/2003	3	53	930	44	2	
Monkey Business	3/23/2003	1	50	1150	90	1.6	
Monkey Business	3/23/2003	2	47	1150	80	1.6	
Monkey Business	3/23/2003	3	50	1150	86	1.6	
Monkey Business	4/26/2003	1	59	940	40	1.9	
Monkey Business	4/26/2003	2	50	680	37	1.7	
Monkey Business	4/26/2003	3	56	770	41	1.7	
Monkey Business	5/25/2003	1	40	600	16	2.6	
Monkey Business	5/25/2003	2	39	670	16	3	
Monkey Business	5/25/2003	3	36	610	14	2.6	
Monkey Business	6/22/2003	1	29	510	12	3.7	
Monkey Business	6/22/2003	2	34	490	13	3.4	
Monkey Business	6/22/2003	3	30	470	13	3.9	
Monkey Business	7/20/2003	1	63	920	55	1.8	
Monkey Business	7/20/2003	2	58	910	47	2	
Monkey Business	7/20/2003	3	59	920	48	1.8	
Monkey Business	8/23/2003	1	59	910	45.	.	
Monkey Business	8/23/2003	2	56	810	45	1.6	
Monkey Business	8/23/2003	3	55	730	47	1.6	
Monkey Business	9/27/2003	1	93	1230	68	1.3	
Monkey Business	9/27/2003	2	105	1080	67	1.2	
Monkey Business	9/27/2003	3	96	1220	60	1.2	

Monkey Business	10/19/2003	1	93	1350	79	1.3
Monkey Business	10/19/2003	2	88	1370	75	1.3
Monkey Business	10/19/2003	3	87	1390	82	1.3
Monkey Business	11/22/2003	1	39	1000	51	1.4
Monkey Business	11/22/2003	2	41.		55	1.4
Monkey Business	11/22/2003	3	39	1020	57	1.3
Monkey Business	12/21/2003	1	37	570	21	2.5
Monkey Business	12/21/2003	2	26	490	17	2.5
Monkey Business	12/21/2003	3	28	590	20	2.1
Monkey Business-holding pond	8/20/1995	1	33	610	16	3
Monkey Business-holding pond	8/20/1995	2	49	660	26	1.8
Monkey Business-holding pond	8/20/1995	3	44	670	24	1.8

Lake	Date	Station	TP (µg/L)	TN (µg/L)	CHL A (µg/L)	SECCHI (ft)	SECCHI 2
Petty Gulf	1/26/2003	1	20	530	5	5.8	
Petty Gulf	1/26/2003	2	22	590	5	6	
Petty Gulf	1/26/2003	3	20	610	4	6.5	
Petty Gulf	2/9/2003	1	20	530	10	4	
Petty Gulf	2/9/2003	2	21	460	12	4	
Petty Gulf	2/9/2003	3	18	550	10	4.5	
Petty Gulf	3/11/2003	1	28	530	6	1.5	
Petty Gulf	3/11/2003	2	25	440	7	2	
Petty Gulf	3/11/2003	3	28	510	7	2.5	
Petty Gulf	4/20/2003	1	17	590	3.	.	
Petty Gulf	4/20/2003	2	19	400	3.	.	
Petty Gulf	4/20/2003	3	16	390	2.	.	
Petty Gulf	5/16/2003	1	23	370	4.	Bottom(6.0)	
Petty Gulf	5/16/2003	2	17	390	4	6.5	
Petty Gulf	5/16/2003	3	17	340	4	5.5	
Petty Gulf	6/30/2003	1	18	310	7	5.5	
Petty Gulf	6/30/2003	2	18	320	5	5.5	
Petty Gulf	6/30/2003	3	17	350	5	5.5	
Petty Gulf	7/20/2003	1	16	340	7	4	
Petty Gulf	7/20/2003	2	20	340	7	4	
Petty Gulf	7/20/2003	3	16	290	8	4	
Petty Gulf	8/29/2003	1	19	600	9	3.5	
Petty Gulf	8/29/2003	2	36	430	9	3.5	
Petty Gulf	8/29/2003	3	23	390	12	3	
Petty Gulf	9/18/2003	1	24	380	12	3	
Petty Gulf	9/18/2003	2	23	380	14	3	
Petty Gulf	9/18/2003	3	26	430	13	3	
Petty Gulf	10/26/2003	1	18	440	8	5	
Petty Gulf	10/26/2003	2	27	280	12	5.5	
Petty Gulf	10/26/2003	3	24	380	10	5	
Petty Gulf	11/21/2003	1	20	340	7	5	
Petty Gulf	11/21/2003	2	19	340	7	5	

Lake	Date	Station	TP (µg/L)	TN (µg/L)	CHL A (µg/L)	SECCHI (ft)	SECCHI 2
Petty Gulf	11/21/2003	3	20	350	7	5.5	
Petty Gulf	12/28/2003	1	19	340	4	6	
Petty Gulf	12/28/2003	2	21	410	5	5.5	
Petty Gulf	12/28/2003	3	25	430	12	5.5	
Pine Hill	1/15/2003	1	25	630	11	4.5	
Pine Hill	1/15/2003	2	21	630	11	4.5	
Pine Hill	1/15/2003	3	21	610	10	4.5	
Pine Hill	2/19/2003	1	24	550	5	4	
Pine Hill	2/19/2003	2	25	630	5	4	
Pine Hill	2/19/2003	3	26	590	5	4	
Pine Hill	3/16/2003	1	23	570	6	6	
Pine Hill	3/16/2003	2	37	610	9.	Weeds(4.0)	
Pine Hill	3/16/2003	3	21	470	6.	Weeds(5.0)	
Pine Hill	4/15/2003	1	18	360	3.	Bottom(5.5)	
Pine Hill	4/15/2003	2	23	440	3.	Bottom(4.5)	
Pine Hill	4/15/2003	3	21	450	3.	Bottom(5.5)	
Pine Hill	5/16/2003	1	20	470	7.	Weeds(5.0)	
Pine Hill	5/16/2003	2	19	410	6.	Bottom(4.0)	
Pine Hill	5/16/2003	3	18	380	6.	Weeds(4.0)	
Pine Hill	6/15/2003	1	15	300	4.	Weeds(4.5)	
Pine Hill	6/15/2003	2	16	280	4.	Bottom(4.5)	
Pine Hill	6/15/2003	3	14	290	4	6	
Pine Hill	7/15/2003	1	15	560	4	7	
Pine Hill	7/15/2003	2	18	400	4	5	
Pine Hill	7/15/2003	3	25	510	4.	Weeds(5.0)	
Pine Hill	8/18/2003	1	16	480	10.	Bottom(5.0)	
Pine Hill	8/18/2003	2	19	450	8.	Bottom(4.0)	
Pine Hill	8/18/2003	3	18	440	9	5.5	
Pine Hill	9/13/2003	1	25	440	7.	Bottom(7.5)	
Pine Hill	9/13/2003	2	31	460	25.	Bottom(4.0)	
Pine Hill	9/13/2003	3	32	410	17.	Weeds(5.0)	
Pine Hill	10/19/2003	1	18	470	6.	Weeds(7.5)	
Pine Hill	10/19/2003	2	17	510	6	4	
Pine Hill	10/19/2003	3	18	350	11	5	
Pine Hill	11/16/2003	1	12	360	3.	Weeds(7.5)	
Pine Hill	11/16/2003	2	21	450	6.	Weeds(4.0)	
Pine Hill	11/16/2003	3	14	330	6.	Bottom(5.5)	
Pine Hill	12/16/2003	1	16	500	3	8	
Pine Hill	12/16/2003	2	16	370	4.	Bottom(5.0)	
Pine Hill	12/16/2003	3	14	380	4.	Bottom(5.0)	

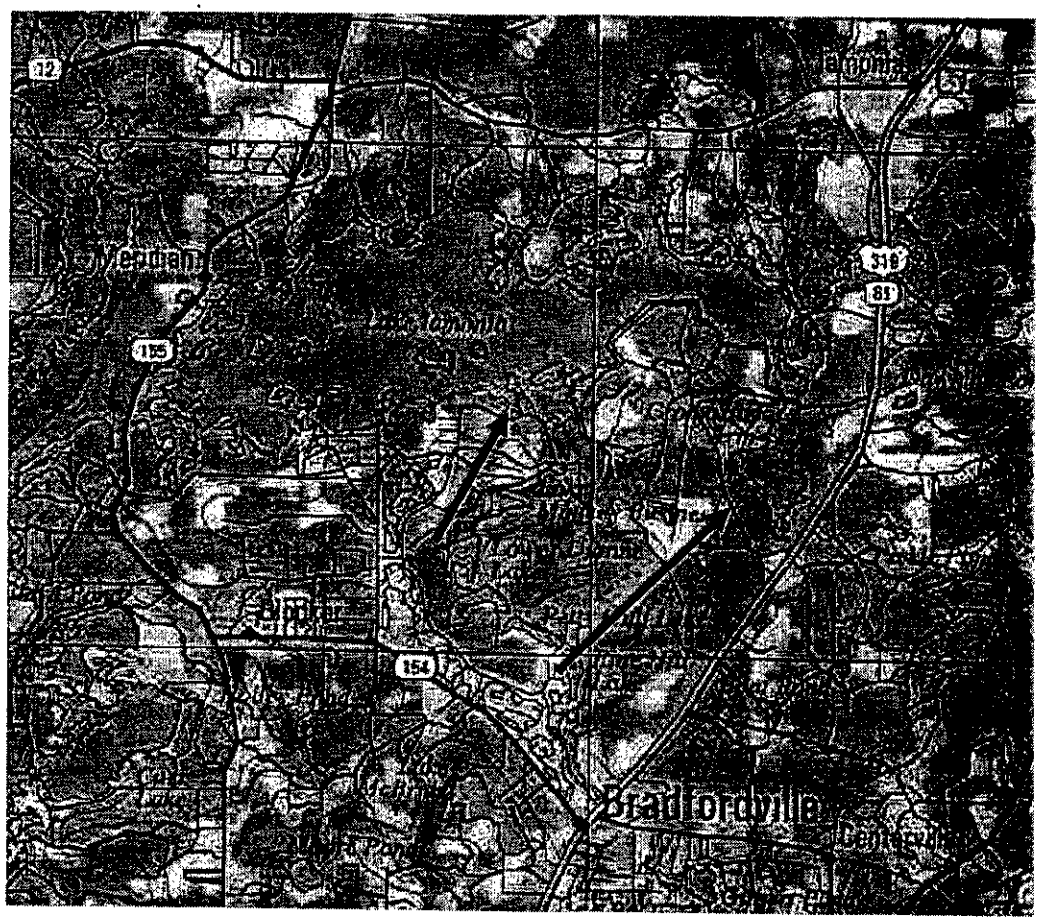
APPENDIX D

The Killearn Lakes Plantation Chain of Lakes

Trophic State Indices (TSI)

The Lakes within the KLP Chain of Lakes drain into Lake Iamonia from at least two directions. Lake Arrowhead and Lake Monkey Business both directly drain into different parts of Lake Iamonia. Lake Monkey Business drains into Lester Cove and Lake Arrowhead drains into Lake Iamonia at the Cromartie Arm.

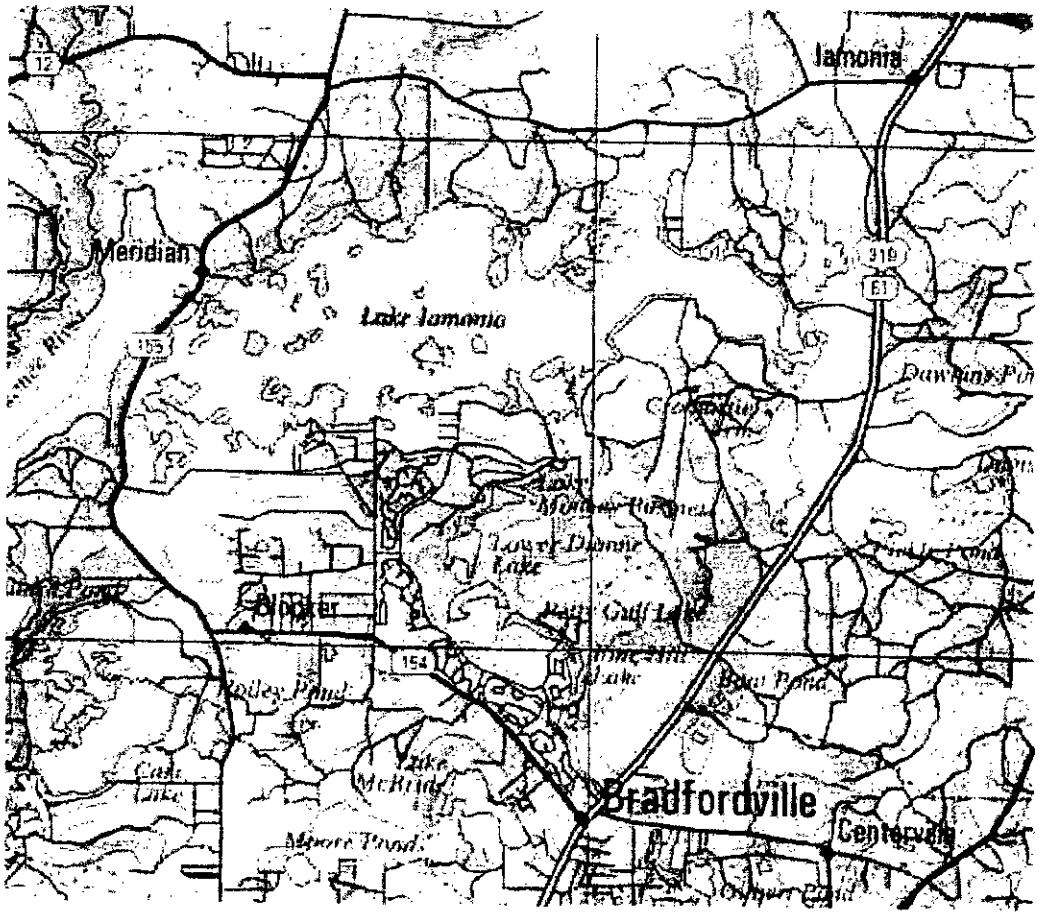
Lake Iamonia Outlet is listed as a medium priority TMDL to be accomplished in the year 2007. Thus the KLP Chain of Lakes drains into an impaired waterbody, Lake Iamonia, scheduled for a TMDL in 2007. The various Lakes within the Killearn Chain of Lakes are listed on the planning list as being impaired due to high Trophic State Indices (TSI), low dissolved oxygen (DO), high Turbidity, high Fecal and Total Coliform bacteria. The lakes within the KLP Chain of Lakes were dropped from the TMDL list because of a perceived lack of data. Lake Monkey business was shown to be a source of nutrient enrichment to Lake Iamonia in previous studies (McGlynn, 1997 and McGlynn 1999). In addition to these studies, 10 years of data were collected on each of these lakes by the University of Florida's Lakewatch program show that water quality within these lakes is not satisfactory.



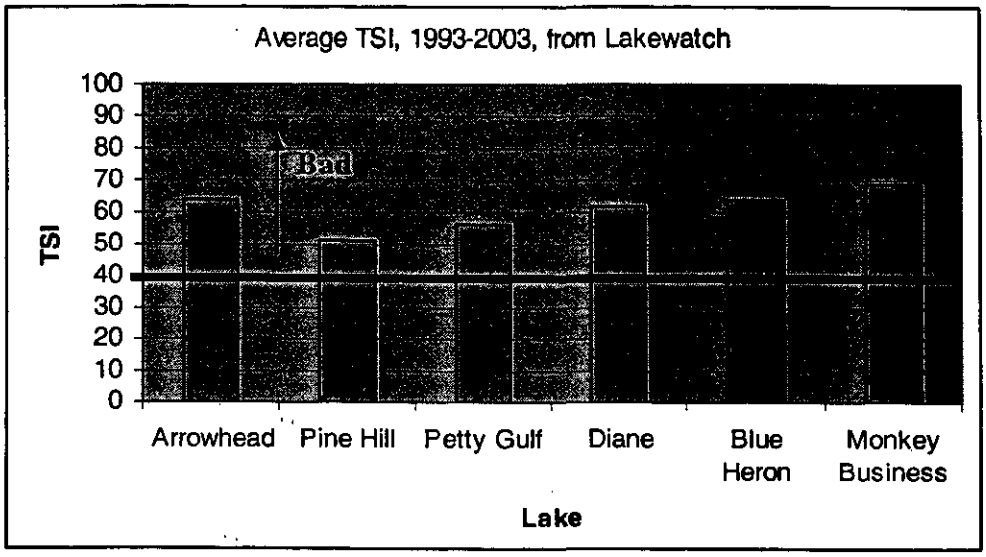
Map of the KLP Chain of Lakes showing the two drainages into lake Iamonia at Lake Monkey Business and Lake Arrowhead.

The Lakes within the KLP Chain of Lakes drain into Lake Iamonia from at least two directions. Lake Arrowhead and Lake Monkey Business both directly drain into different parts of Lake Iamonia. Lake Monkey Business drains into Lester Cove and Lake Arrowhead drains into Lake Iamonia at the Cromartie Arm.

Lake Iamonia Outlet is listed as a medium priority TMDL to be accomplished in the year 2007. Thus the KLP Chain of Lakes drains into an impaired waterbody, Lake Iamonia, scheduled for a TMDL in 2007. The various Lakes within the Killearn Chain of Lakes are listed on the planning list as being impaired due to high Trophic State Indices (TSI), low dissolved oxygen (DO), high Turbidity, high Fecal and Total Coliform bacteria. The lakes within the KLP Chain of Lakes were dropped from the TMDL list because of a perceived lack of data. Lake Monkey business was shown to be a source of nutrient enrichment to Lake Iamonia in previous studies (McGlynn, 1997 and McGlynn 1999). In addition to these studies, 10 years of data were collected on each of these lakes by the University of Florida's Lakewatch program show that water quality within these lakes is not satisfactory.

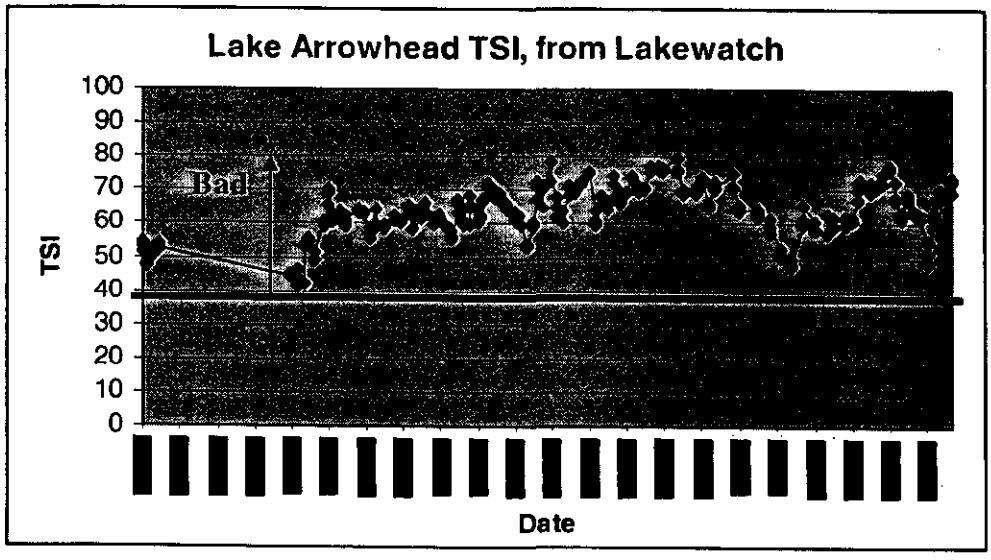


Map of the KLP Chain of Lakes showing the two drainages into lake Iamonia at Lake Monkey Business and Lake Arrowhead.

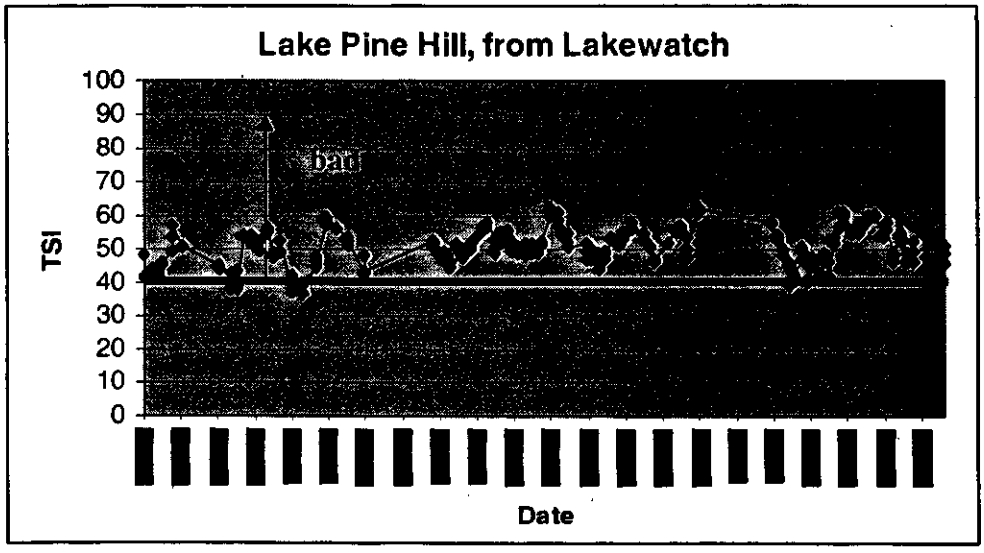


Average TSI calculated from LAKEWATCH chlorophyll, total phosphorus and total nitrogen data from 1993 to 2003.

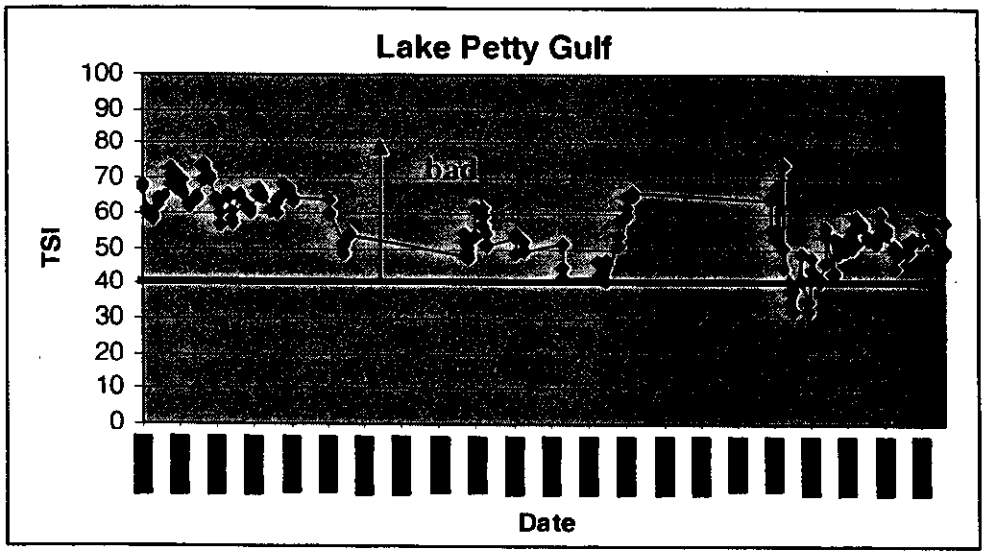
Values over 40 are considered impaired for clear lakes by FDEP. All of these lakes are impaired according to their TSI values. Lakes Arrowhead and Monkey Business, the two lakes that discharge into Lake Iamonia are the worst.



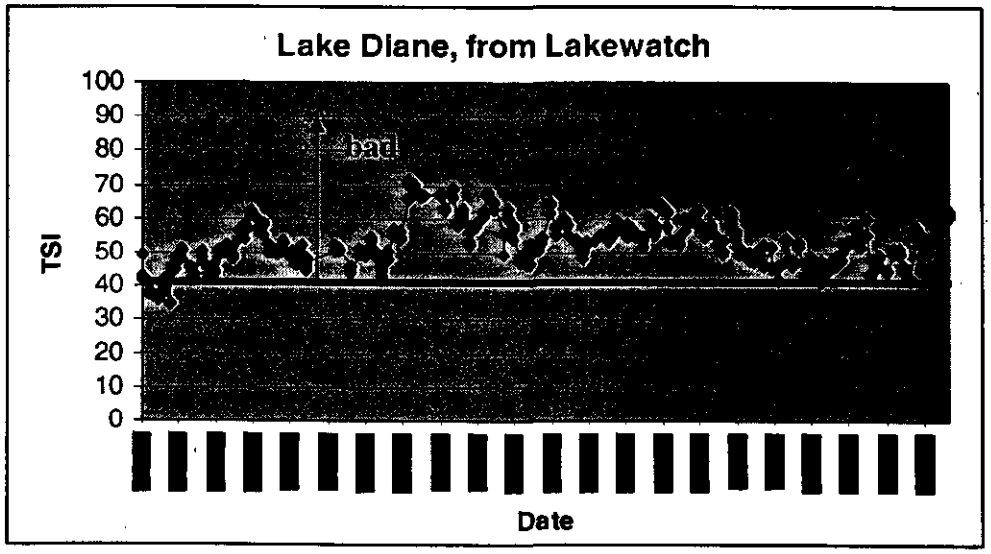
TSI's for Lake Arrowhead are the second highest within the KLP Chain of Lakes. They are not considered good. This Lake discharges into Lake Iamonia.



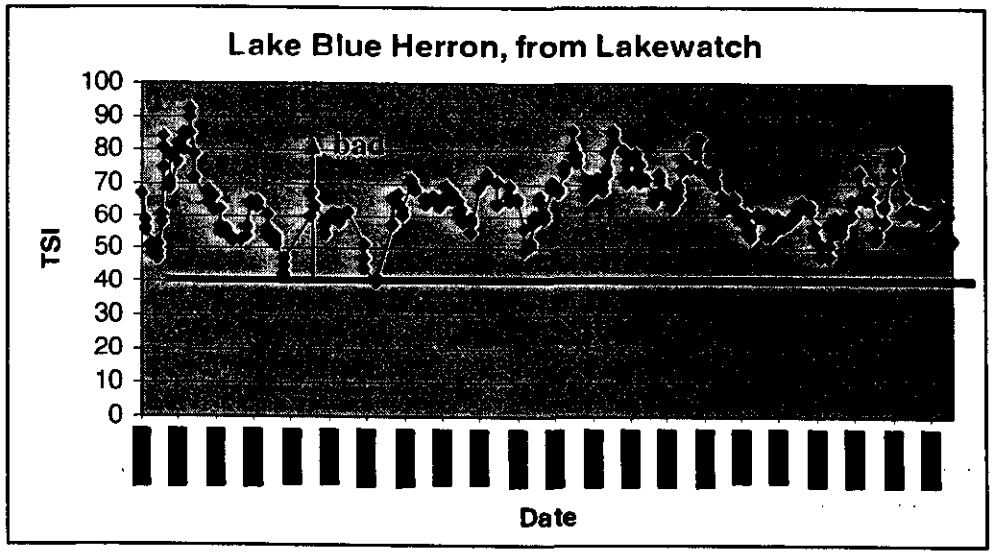
TSI's for Lake Pine Hill are the best within the KLP Chain of Lakes. They are not considered good.



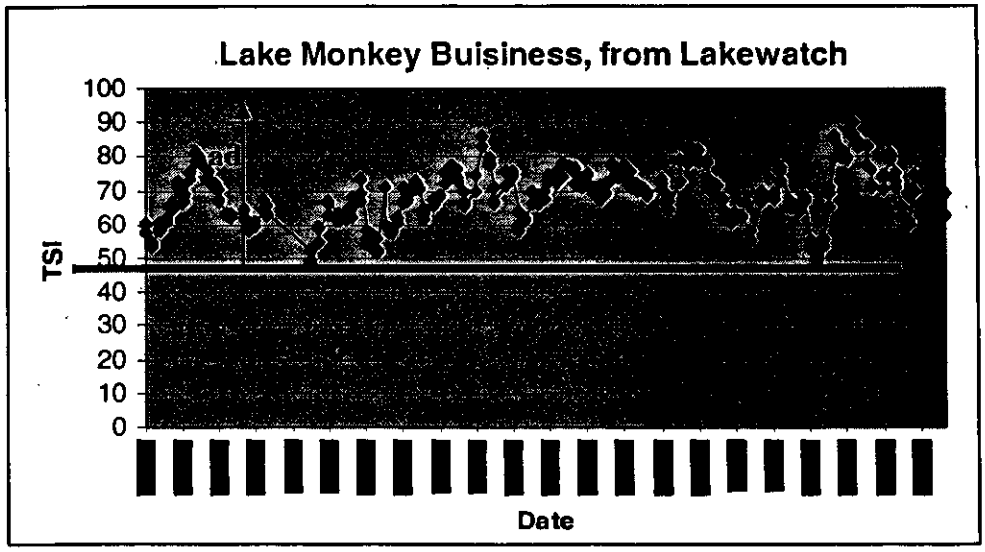
TSI's for Lake Petty Gulf are the slightly worse than Lake Pine Hill. They are not considered good.



TSI's for Lake Diane represent the middle values within the KLP Chain of Lakes. They are not considered good.



TSI's for Lake Blue Heron are the slightly worse than Lake Diane. They are not considered good.



TSI's for Lake Monkey Business are the worst in the KLP Chain of Lakes. They are not considered good. This lake discharges directly into Lake Iamonia.

Summary: There is a lot of data showing that the water quality within the KLP Chain of Lakes is quite poor and has been in this state for some time. The Lakes with the worst water quality are the three (Monkey Business, Blue Heron and Arrowhead) that discharge into Lake Iamonia (Lake Arrowhead does not discharge directly into the chain of lakes but rather to arm that directly flows into Lake Iamonia). It has been shown in previous studies that the discharge from Lake Monkey Business into Lake Iamonia contributes to the nutrient enrichment of Lake Iamonia, an 'Outstanding Florida Waterbody' (OFW) that is on the FDEP's verified list and is scheduled for a TMDL in 2007.

APPENDIX E

The Killearn Lakes Plantation Chain of Lakes

Letter of Commitment from Leon County

September 13, 2004

Mr. Paul Thorpe
Northwest Florida Water Management District
81 Water Management Drive
Havana, Florida 32333

Re: Killearn Lakes Restoration - Florida Forever Grant Application

Dear Mr. Thorpe:

I AM PLEASED TO SUBMIT THE ATTACHED Killearn Lakes Restoration - Florida Forever Grant Application. LEON COUNTY WILL ALLOCATE $247,000 AS MATCH TO THIS WORTHWHILE PROJECT IF IT IS FUNDED. THANK YOU FOR YOUR CONSIDERATION OF THE PROPOSAL.

Sincerely,

Parwez Alam, County Administrator

attached: Killearn Lakes Restoration - Florida Forever Grant Application

APPENDIX F

Monitoring Plan
Sediments, Biology (Aquatic Macrophytes) and Stormwater Loading

Sediment Quality

All sediment samples will be taken in triplicate, the top 5 cm homogenized for analysis. All 6 original stations will be sampled once a year for the following parameters (a total of 36 cores).

A. Sediment Depth
B. Sediment Type/Grain Size
C. Depth from sediment/water interface to underlying hard pan
D. Moisture Content of Sediment (mg/kg)
E. Organic Content of Sediment (mg/kg)
G. Total Nitrogen (mg/kg, dry weight)
H. Total Phosphorus (mg/kg, dry weight).

Additional Pre-Restoration and Post-Restoration parameters to be added to the existing program to compare with previous studies and NPDES Parameters

1. Organics: run by GC/MS Methods 8270 (Guidance Manual for the preparation of part 2 of the NPDES permit application for discharges from municipal separate storm sewer systems, EPA 833-B-92-002)
   A. Herbicides (Table II, Appendix D, 40 CFR, Part 122)
   B. Base/Neutral (Table II, Appendix D, 40 CFR, Part 122)
   C. Acid Compounds (Table II, Appendix D, 40 CFR, Part 122)
   D. Pesticides (Table II, Appendix D, 40 CFR, Part 122)
2. Metals: run by ICP-MS, EPA 6010

Cr	Pb	Zn	Cd	Cu

Biology (Aquatic Macrophytes)

1. Estimated percent coverage of the lake bottom by submerged and emergent macrophytes within three non-overlapping randomized quadrants.
2. Estimated percent coverage of the lake surface by submerged and emergent macrophytes within three non-overlapping randomized quadrants.
3. Estimated percent total volume of the water in lake.
4. Identify the dominant species and two subdominant species of macrophytes occurring at each station. Compare with the annual FDEP SAV survey.
5. Determine the Biomass of the submerged and emergent macrophytes within three non-overlapping randomized quadrants.
6. Algal toxicity bioassays assays may be run on algal blooms in the lakes.
7. Determination of emergent and floating plant cover. KHOA will use volunteers to perform this function.

Stormwater Loading

Measurement of stormwater loading to the lake will be accomplished through the sampling of at least eight storm events over the 24-month monitoring period. Four storm events for the Pre-Restoration period and four storm events during the Post-Restoration period.

The stormwater water quality samples will be collected using automatic water quality samplers set up on the tributary streams and by the grab sample method. The automatic samplers will

collect flow-weighted composite samples using a Handar 555 recorder as the controlling device. The flow-weighted composite samples will be collected in a 2.5 gallon glass bottle in the automatic sampler. These flow-weighted samples will be distributed into the appropriate analyte bottles for delivery to the laboratory.

Auto-Sampler Laboratory Analytes

The laboratory bottles for each stormwater sample include:

Water Quality Parameters

W-NO_2NO_3 Nitrate +nitrite analysis of water by Method 353.2
W-TKN Total Kjeldahl Nitrogen in water samples by Method 351.2
W-TP Total Phosphorus in water samples by Method 365.4
W-PO_4 Orthophosphate analysis of water samples by Method 365.1
W-TSS Total suspended solids in water by Method 160.2
W-TDS Total Dissolved solids in water by Method 160.1

Becteriological Lab Parameters

W-F. Entero. Enterococcus in water by Method SM 9230C
W-Fecal Coli. Fecal Coliform in water by Method SM 9222D

All sample analysis will be performed by NELAC certified laboratories.

APPENDIX G

The Killearn Lakes Plantation Chain of Lakes

Estimated Sediment Removal Costs

Killearn Lakes Plantation Lakes for Sediment Removal

Lake Name	Size (Acres)	Est. Sediment (Acres)	Depth=1 foot (Acre Feet)	Est Volume (Cubic Yards)	Est Cost $2/yd ^{3}	Est Cost $3/ yd ^{3}
Blue Heron	58	15	15	23,889	47,778	71,667
Arrowhead	8	1	1	1,593	3,185	4,778
Diane	85	10	10	15,926	31,852	47,778
Pettygulf	26	5	5	7,963	15,926	23,889
MonkeyBusiness	39	15	15	23,889	47,778	71,667
Pine Hill	36	1	1	1,593	3,185	4,778
Total		47		74,853	$149,704	$224,557

Lake Name	Size (Acres)	Est. Sediment (Acres)	Depth=2 foot (Acre Feet)	Est Volume (Cubic Yards)	Est Cost $2/yd ^{3}	Est Cost $3/ yd ^{3}
Blue Heron	58	15	30	47,778	95,556	143,333
Arrowhead	8	1	2	3,185	6,370	9,556
Diane	85	10	20	31,852	63,704	95,556
Pettygulf	26	5	10	15,926	31,852	47,778
MonkeyBusiness	39	15	30	47,778	95,556	143,333
Pine Hill	36	1	2	3,185	6,370	9,556
Total		47		149,704	$299,408	$449,112

* This project will focus on only Lake Blue Heron Sediment removal.